FACSIMILE TRANSCEIVER

OKIFAX 610/660

Field Service Handbook

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CHAPTER 1

GENERAL INFORMATION

1.1 GENERAL PERFORMANCE

(1) Type of appearance
Desktop type

(2) Compatibility
ITU-T Group 3 facsimile transceiver

(3) Applicable line
Public Switched Telephone Network (PSTN) or Private Branch Exchange (PBX)

(4) Communication mode
Half duplex

(5) Protocol
ITU-T REC. T.30

(6) Coding scheme
Modified Huffman (MH),
Modified READ (MR)
Modified Modified READ (MMR)

(7) MODEM
ITU-T REC. V.33 (14000/12000 bps)
ITU-T REC. V.29 (9600/7200 bps)
ITU-T REC. V.27 ter (4800/2400 bps)
ITU-T REC. V.21 channel 2 (300 bps)

(8) Transmission speed
8 sec/ ITU-T No.1 sample document for memory transmission.
12 sec/ ITU-T No.1 sample document for feeder transmission.

(9) Minimum scan line time for sending
10 ms

(10) Minimum scan line time for receiving
10 ms at 7.70 line/mm
20 ms at 3.85 line/mm

(11) Document size
Maximum 219 mm (W) x 600 mm (L)
Minimum 147 mm (W) x 150 mm (L)

(12) Printing width
208 mm (ISO A4 size)

(13) Recording paper width
(A4) 210 mm . 297 mm

(14) Printing method
Thermal transfer

(15) Scanning resolution
Horizontal: 8 dots/mm
Vertical: PHOTO mode: 7.70 line/mm
COPY mode : 7.70/15.4 line/mm selectable
Transmission in non-PHOTO mode:
3.85 line/mm (STD),
7.70 line/mm (FINE), or
15.4 line/mm (SUPER FINE)
Selectable by key operation

(16) Power source

Voltage: AC 100~120 V 2A or AC 220~240 V 1A
Frequency: 50/60 HZ ñ 3 HZ 50/60 HZ ñ 3 HZ

1.2 GENERAL USER'S FUNCTION

(1) Auto dial

- One-touch key (01~10)
- 99 Alpha search dialing (32 digit numbers/20 characters)
- Group dialing: One pre-programmed group max. 109 numbers.
  One key-in group of max. 128 numbers.

(2) Manual dial

- Keypad dial

(3) Receive mode

- FAX receive mode
- TEL receive mode
- TEL/FAX automatic switchover
- TAD/FAX automatic switchover

(4) Last number redial

(5) Telephone directory

(6) PHOTO mode

(7) Voice request

(8) Multi copy

(9) Polling transmission

(10) Polling reception

(11) Delay transmission

(12) Sender identification (Sender ID)

(13) Reports

- Message confirmation (Single location)
- Activity report
- TEL directory list
- Configuration

1.3 GENERAL MAINTENANCE FUNCTION

- Self-diagnosis

. Turn on the power and press SET-UP key at the same time.
Enter password 54188 otherwise 5 sec back to standby.

(1) ROM version

(2) Print test (1)

(3) Print test (2)

(4) Check sum display

(5) LED test

(6) Key test

(7) LCD test

(8) SENSOR test

(9) CIS calibration

(10) TSI/CSI setting

(11) DP/MF setting

(12) Resolution default

(13) T30 (A-E) monitor

(14) Set auto redial

(15) Series pick up

(16) Detect dial tone

(17) Line equalizer

(18) ECM mode

(19) Make ratio

(20) Parallel pick-up

(21) Modem speed

(22) Tx level

(23) Rx printer mode

(24) Satellite delay

(25) Set CNG Tx time

(26) System initial

(27) PTT pattern

(28) Print service set

1.4 GENERAL APPEARANCE

Figure 1.4.1~1.4.2 shows the general appearance
Figure 1.4.3~1.4.4 shows the operation panel

Figure 1.4.1 OKIFAX 610 General Appearance

Figure 1.4.2 OKIFAX 660 General Appearance

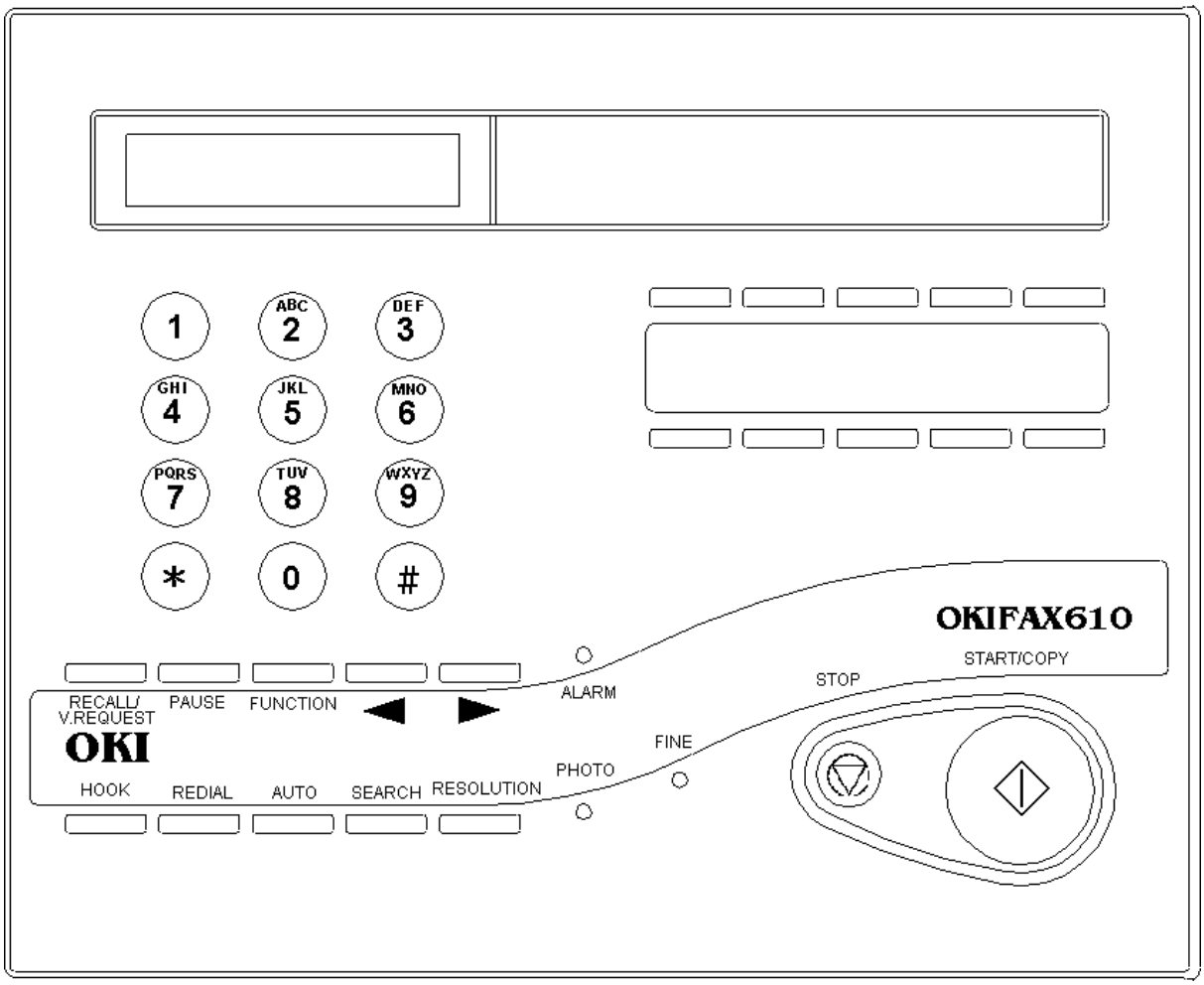


Figure 1.4.3 OKIFAX 610 Operation Panel

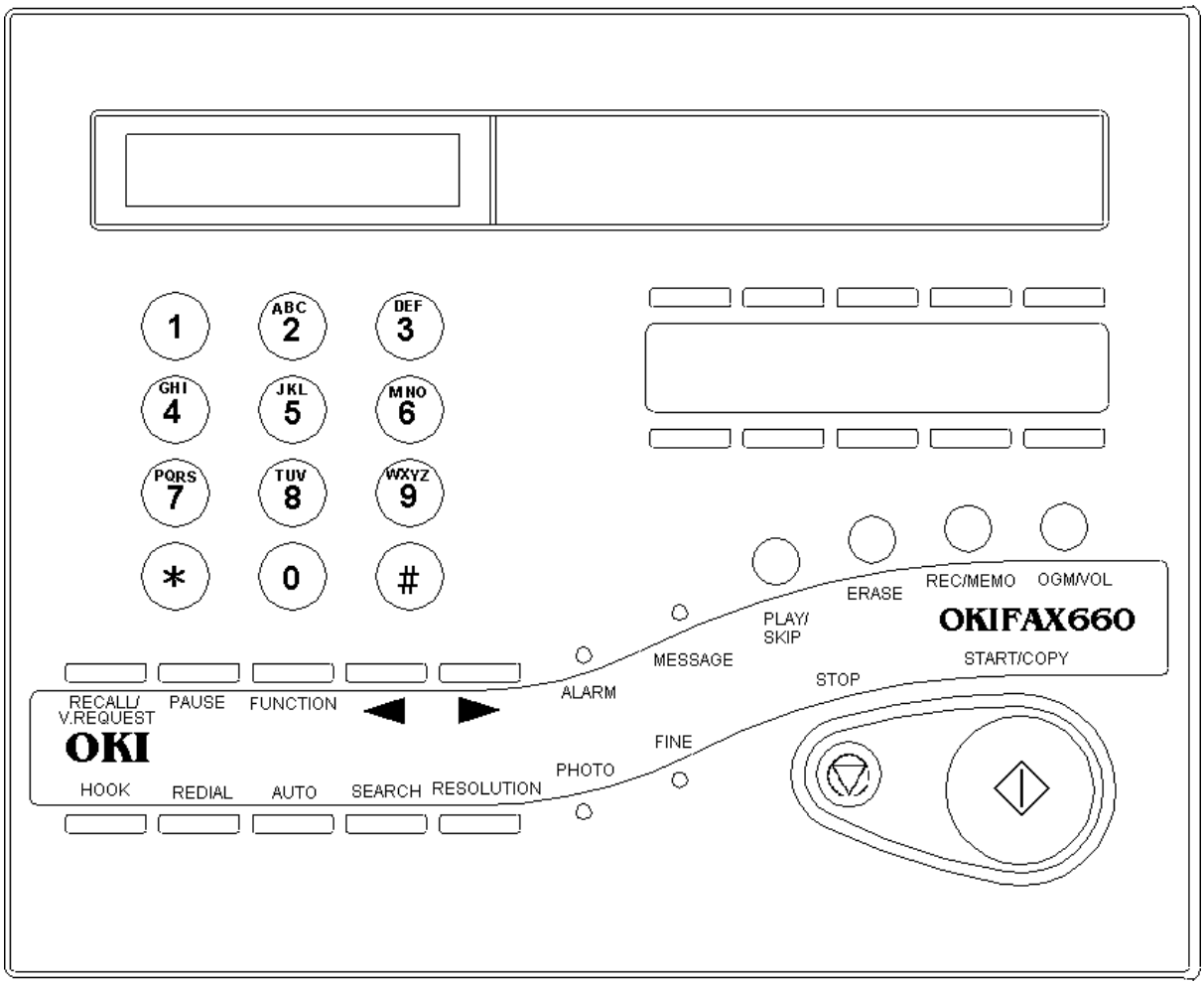


Figure 1.4.4 OKIFAX 660 Operation Panel

CHAPTER 2

SPECIFICATION

2.1 STANDARD PERFORMANCE SPECIFICATIONS

Table 2.1.1 shows standard performance specifications.

Table 2.1.1 Standard Performance Specification (1/6)

<table>
<tr><th>NO.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>1</td><td>Type of appearance</td><td>Desktop type</td></tr>
<tr><td>2</td><td>Compatibility</td><td>ITU-T Group 3 facsimile transceiver</td></tr>
<tr><td>3</td><td>Applicable Line</td><td>General Switched Telephone Network (GSTN)</td></tr>
<tr><td>4</td><td>Line interface</td><td></td></tr>
<tr><td></td><td>1) Impedance</td><td>600Ω balanced</td></tr>
<tr><td></td><td>2) Sending power level</td><td>0 dBm to - 15 dBm range</td></tr>
<tr><td></td><td>3) Receiving power level</td><td>(Adjustable in 1 dBm steps.)</td></tr>
<tr><td>5</td><td>Communication mode</td><td>Half-duplex</td></tr>
<tr><td>6</td><td>Protocol</td><td>ITU-T Rec. T.30</td></tr>
<tr><td>7</td><td>Coding scheme</td><td>1) One-dimensional coding scheme:
Modified Huffman (MH)
2) Two-dimensional coding scheme:
Modified Read (MR)
3) Three-dimensional coding scheme:
Modified Modified Read (MMR)
3) Error Correction Mode (E.C.M.)</td></tr>
<tr><td>8</td><td>MODEM</td><td></td></tr>
<tr><td></td><td>1) High-speed MODEM</td><td>a) ITU-T Rec. V.17 (14400/12000 bps)
b) ITU-T Rec. V.29 (9600/7200 bps)
c) ITU-T Rec. V.27ter (4800/2400 bps)</td></tr>
<tr><td>9</td><td>Fallback</td><td>Automatic fallback can perform the following sequence in accordance with FTT, RTN.
<table><tr><th>Fallback rank</th><th>Transmission speed</th><th>Activated by FTT. Times</th><th>Activated by RTN. Times</th></tr><tr><td>1st</td><td>14400 bps</td><td>1</td><td>1</td></tr><tr><td>2nd</td><td>12000 bps</td><td>1</td><td>1</td></tr><tr><td>3rd</td><td>9600 bps</td><td>1</td><td>1</td></tr><tr><td>4th</td><td>7200 bps</td><td>1</td><td>1</td></tr><tr><td>5th</td><td>4800 bps</td><td>1</td><td>1</td></tr><tr><td>6th</td><td>2400 bps</td><td>1</td><td>1</td></tr></table>When the last trial fails, the transmitting station transmits a DCN signal to the remote station for disconnection.</td></tr>
</table>

Table 2.1.1 Standard Performance Specifications (2/6)

NO.	Item	Specifications
10	Transmission time	8 sec for memory transmission. 12 sec for feeder transmission. Note: This is the time for Phase C transmission in 3.85 line/mm and 14.4K bps speed in MMR code transmission.
11	Minimum scan line time for sending	10 ms
12	Minimum scan line time for receiving	10 ms at 7.70 line/mm and 20 ms at 3.85 line/mm when receiving.
13	Ringing signal detection sensitivity	
	1) Voltage range	25 to 90 V r.m.s. Inoperative below 15 V
	2) Frequency range	16 to 70 Hz
	3) Ringing signal detection	Two-ringing signal
	4) Ringing signal voltage duration	Longer than 180 ms Inoperative if the duration is 90 ms or less.
14	Type of document to be transmitted	
	1) Width	210mm (A4), 216mm (Letter)
	2) Length	147mm~600mm
	3) Thickness	Based on common bond paper, a) 0.07~0.11 mm for multiple page feeding b) 0.06~0.15 mm for single page feeding

Table 2.1.1 Standard Performance Specifications (3/6)

NO.	Item	Specifications
	4) Shape	Rectangular
	5) Opacity	Document allowing less than 40% of the scanner source light to pass through them
15	Automatic Document Feeder (ADF)	Max 5 documents / A4 Documents shall be placed face down on ADF stacker.
16	Document skew	Max. 3 mm skew over a document of A4 length.
17	Effective reading width	210 mm ñ 1%
18	Image scanning system	Contact sensor 1728 bits
19	Scanning resolution	Horizontal: 8 dots / mm Vertical: 1) COPY mode: 3.85/7.70/15.40 line/mm selectable 2) STD mode: 3.85 line/mm 3) FINE mode: 7.70 line/mm 4) SUPER FINE mode: 15.40 line/mm 5) PHOTO mode: 7.70 line/mm
20	Contrast control	Automatic background sensing A continuous document background of 0.3 OD (optical density) or less will de transmitted as white. Up to 297 mm in length.
21	Document oversize/ jam detection	1) Transmission will stop and line disconnection will occur when the end of the document is not detected within 600 mm after scanning begins. 2) A jam will also be declared if the document does not reach the scanning position within 4 seconds after the start of a document feed. *Note: When a jam is detected during message transmission, the machine will stop, but its receiving capability will remain valid.*

Table 2.1.1 Standard Performance Specifications (4/6)

NO.	Item	Specifications
22	Document jam removal	Manual release
23	Plain paper	1) Width: 210 ñ 0.5 mm (ISO A4 size) 2) Printing color: Black 3) XERO. 4024 or L Paper (80 g/.)
24	Effective recording width	208 mm
25	Printing system	Thermal transfer
26	Skew of recording paper	Maximum allowable skew of the recording paper: + or - 3 mm over A4 length paper
27	Document skew	Max. 3 mm skew over a document of A4 length.
28	Copy density	1.0 + 0.3 OD.
29	Copy uniformity	Printed copies will exhibit a uniform density of the printed and background area: 1) same page: 0.2 OD (Optical density) 2) different page: 0.3 OD (Optical density)
30	Copy stacking	Can discharge 50 printed A4 copies and stack them without jamming.
31	Documents are too long or shortage	ñ 3% + document size.
	Recording paper running out	Can detect the no paper condition with a photo sensor. When the paper condition with LCD display will show “NO PAPER”.

Table 2.1.1 Standard Performance Specifications (5/6)

<table>
<tr><th>NO.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>33</td><td>Overheat Protection</td><td>heat alarm state: Higher than 65. at the Printing head unit base.
When an heat alarm state detected during reception, the FAX interrupts the reception as follows:

- LCD displays “HEAT ALARM”

- Generates an alarm tone.

- Transmits a DCN signal in response to an EOP/EOM/MPS signal from the remote station and disconnects the line.
The heat alarm state can be automatically released by natural cooling.</td></tr>
<tr><td>34</td><td>Power supply unit and power consumption of the machine</td><td>
<table>
<tr><td>Input voltage range (* 1)</td><td>AC 220~240 V</td></tr>
<tr><td>Frequency range</td><td>50 / 60 Hz</td></tr>
<tr><td>Power consumption of the machine</td><td></td></tr>
<tr><td>1) Transmit</td><td>25 W</td></tr>
<tr><td>2) Receive (* 2)</td><td>40 W</td></tr>
<tr><td>4) Local copy (* 2)</td><td>40 W</td></tr>
<tr><td>5) Local copy (All black)</td><td>120 W</td></tr>
<tr><td>6) Standby</td><td>10 W</td></tr>
</table>
* 1 The range depends on the locally provided power supply
* 2 Chart: ITU-T No.1 sample document
</td></tr>
</table>

Table 2.1.1 Standard Performance Specifications (6/6)

NO.	Item	Specifications
35	Ambient condition	
	1) Operating condition	a) Temperature: 7. to 35.
		b) Relative humidity: 30 to 80% (Non- condensing)
	2) Storage condition	a) Temperature: -20 to 60. for 48 hours
		b) Relative humidity: 20 to 85% (Non- condensing)
36	Dimension	1) Width: Approx. 306 mm
		2) Depth: Approx. 320 mm
		3) High: Approx. 232 mm
37	Weight	Approx.: 4.5 Kg.
		Excluding accessories and packing materials.
38	Accessories	1) Handset and Spring Cord . 1
		2) TEL Line Cord . 1
		3) Ribbon Hook . 1
		4) Thermal Ribbon Roll . 1 (20 meters) (W/Gear Left-R & Right Bushing)
		5) Power Cord . 1
		6) User‘s Guide . 1
		7) Warranty Card . 1
		8) Quick User Card . 1 (660 Only)

2.2 RELIABILITY

Table 2.2.1 shows reliability items.

Table 2.2.1 Reliability

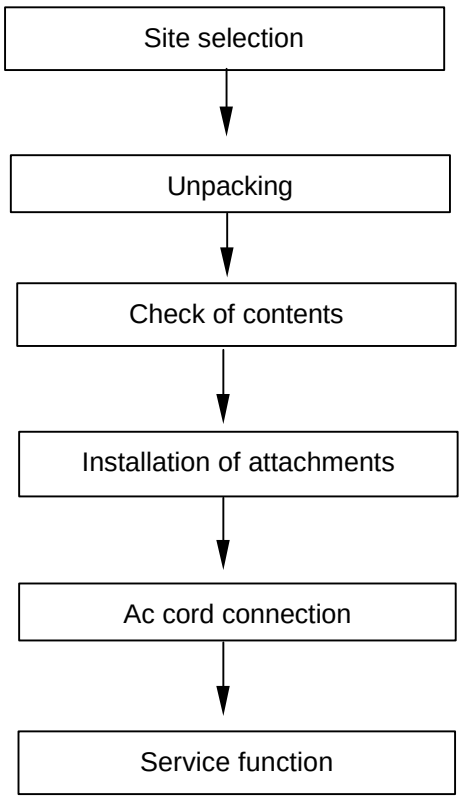
NO.	Item	Specifications
1	Feeder reliability A.D.F.	Jam occurrence and misfeeds in the automatic document feeding will be less than one in 500 operations for all specificied documents. Multi-feed error will be less than one of 300 papers fed.
2	Feeder reliability A.P.F.	Jam occurrence and misfeeds in the automatic document feeding will be less than one in 500 operations for all specificied documents. Multi-feed error will be less than one of 300 papers fed.
3	Feeder separation rubber useful time	The separation rubber will not require replacement for at least 15,000 documents fed.
4	Thermal printing head life cycle	The life of any single element on the printing head will be greater than $3 \cdot 10^5$ cycles. One cycle is defined as the sequence required to print one black picture element (PEL). The abrasion run length of the thermal printing head will be greater than 25 km of recording paper. “ Abrasion run ” is defined as all specified paper running pressed against the thermal printing head.
5	Battery	The life of the battery is three years. Ni-CD battery rechargeable.
6	MTBF	The MTBF for the overall machine will exceed 30,000 hours of actual operation. The MTBF will be measurable at a confidence level of 85% under controlled laboratory conditions.
7	Contact Image Sensor life cycle	The MTBF will be based on 40% reception 20% copy. Exceed 1,000 hours in continuous running. under the normal environment.

CHAPTER 3

INSTALLATIONS

3.1 GENERAL

The following flowchart outlines the installation procedure.



(See 3.2)

(See 3.3)

(See 3.4)

(See 3.5)

(See 3.6)

(See 3.7)

3.2 SITE SELECTION

The installation site

.Shall be free from outside vibrations, dust, etc;
.Shall not be directly exposed to sunlight and sudden changes in temperature;
.Must be horizontal and flat;
.Should have enough space in front of FAX machine to allow recording paper and documents to be stacked;
.Shall not have any large, electrical noise producing machines nearby.

3.2 UNPACKING

Procedure

(1) Open the top cover of the cardboard box.

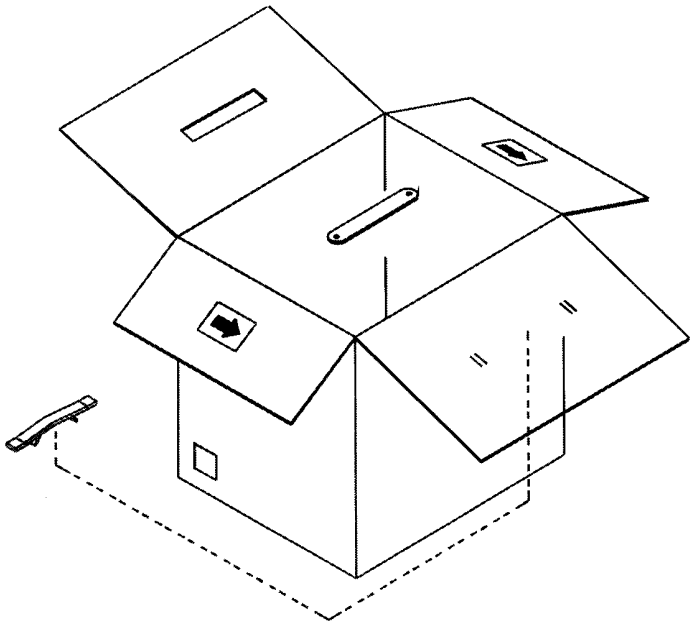
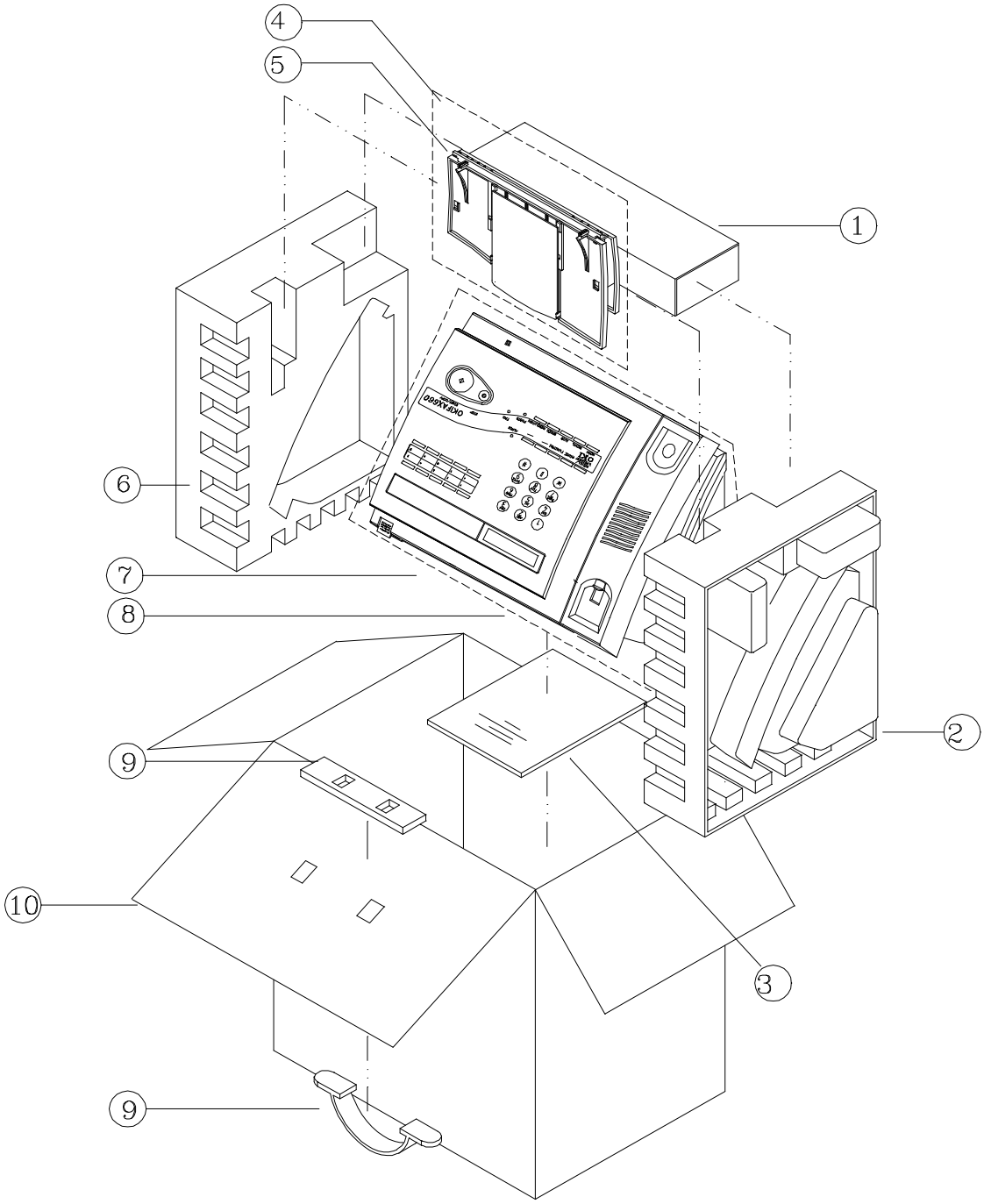


Figure 3.3.1 Unpacking Procedure (1)

(2) Take out the machine with Styrofoam from the box. (See Figure 3.3.2)

(3) Take out the machine with plastic wrapper from the box.



NO	ITEM	P/N	NO	ITEM	P/N
1	ACCESSORY BOX ASM’	0482346525	7	FACSIMILE UNIT	0482347500
2	LEFT PAD	0482348521	8	PE BAG B	9554224901
3	USER GUIDE	0482346500	9	HANDLE	0482313070
4	PE BAG C	9553101400	10	CARTON	0482346523
5	PAPER TRAY	0482346300	11	ID TAG	0482347600
6	RIGHT PAD	0482346522	12		

Figure 3.3.2 Unpacking Procedure (2)

3.4 CHECK OF CONTENTS

After having taken out the machine and accompanied accessories from the cardboard box, check the contents according to the following list:

Item No.	Contents name	Q'ty	Remark
1	FAX machine	1	
2	Handset and spring cord	1	
3	Ribbon roll (W/Gear left-R & right bushing	1	20 meters
4	Power cord	1	
5	Ribbon hook	1	
6	TEL line cord	1	
7	User guide	1	

3.5 INSTALLATION OF ATTACHMENTS

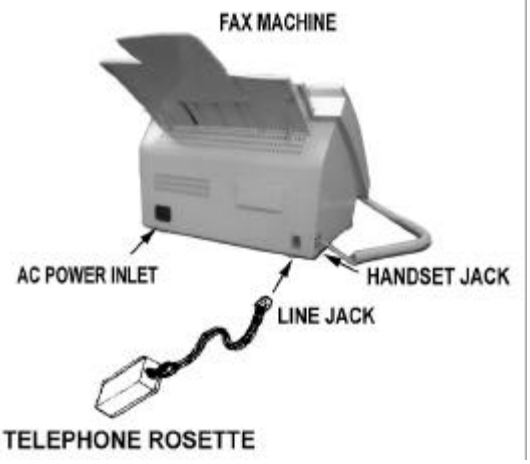
(1) Items

.Handset and answering machine (option).
.Ribbon roll and recording paper

(2) Procedure

1) Handset and Answering Machine

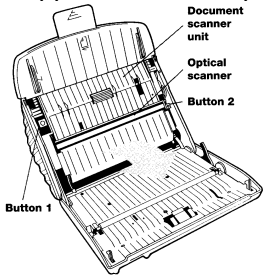
Plug in the telephone company‘s line set to LINE jack , attach handset set to upper on facsimile and connect to H/SET jack. Connect the extension TAD set to TELEPHONE RESETTE.



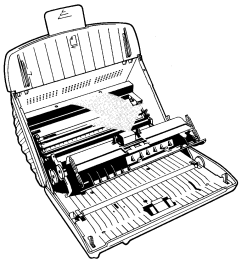
2) How to Load Ribbon Roll:

a. Open the operation panel (press the “Push to Open Button” and pull it toward you) and release the after the handset remove from the cradle and release the upper frame (push the Catch 1, 2 at the both sides of Upper Frame to release the Upper Frame).
b. Insert the White Spindle Cap and Gear Wheel into the core of the ribbon roll from both sides and take off the rubber band, then place into the compartment.
c. Identify the green color cap to be placed at the rear compartment, and the white gear wheel is placed at the left side.
. *Put the left and of the roll into the spring axis then put the right end of the roll into the axis.*
. *Put the small roll into the front compartment, and make sure the gear wheel and spindle cap in its location.*
d. Close the upper frame and operation panel by pressing down firmly on the sides with both hands.

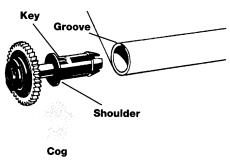
a.

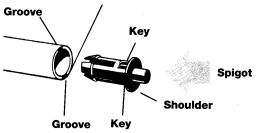


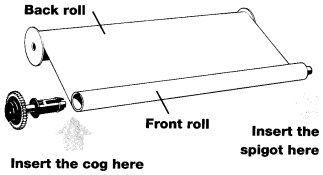
b.



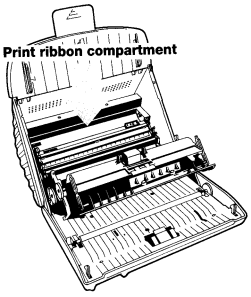
c.

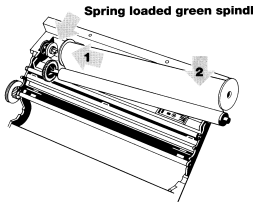


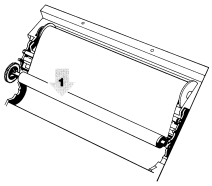


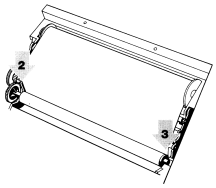


d.









3) Specifications of the Ribbon Roll Size:

a. The diameter of the ribbon roll should be less than 36 m/m, width 216 mm and length 60 M. (Core of the ribbon roll is 0.5“)
b. Use only the ribbon roll recommended for this machine to avoid poor printing.
c. (authorized supplier)
d. Store the unused ribbon in a dry and cool place.

4) How to Change the Ribbon Roll:

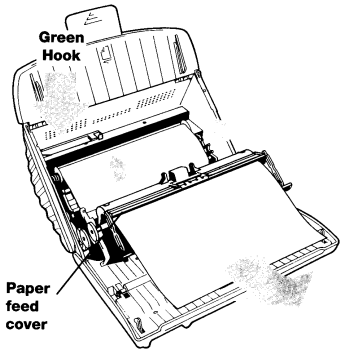
To remove the print ribbon

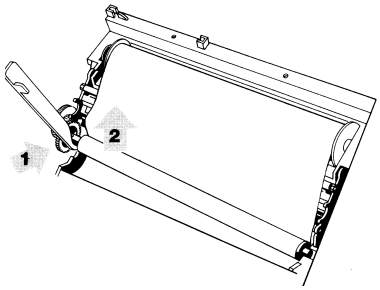
Remove the handset from it’s cradle before opening the front panel. This will prevent it falling off when the panel is opened.

a. Follow instructions of 5.(1) to open operation panel and scanner unit.
b. Push up the green buttons marked 1 and 2. Open the document scanner unit by pulling it for ward as shown below. Pull open the paper feed cover and remove the sheet of paper feed cover until it clicks shut on both sides. The green hook located at the rear of the print ribbon compartment is for use when removing the print ribbon.

. *When removing the print ribbon make sure to remove and save the cog and spigot from the front roll as these will need to be inserted in the new print roll.*

c. Remove the hook from its housing and use it to remove the old print ribbon by hooking it under the cog (1) and lifting it up (2). Lift out the front roll.
d. Follow instructions of 2.(1) (a ~d) to load new ribbon.





5) Installation and Retreat of the Recording Paper

Paper is necessary to print out the received documents, copies, communication reports ... etc.

A. Installation of the Recording Paper

a. Lift the paper support guide.
b. Prepare a bundle of A4 size normal paper 210m/m . 297m/m (50 pages maximum), and grasp it at half of length by both hands.
c. Insert the bundle of paper to its location.

B. Recording Paper Retreat

a. Lift the top face of paper on paper tray then pull the loose of paper to completely release it, push down the button to open the operation panel.
b. Open the next upper frame recording to the step of (2).1a ~b.
c. Release the lower guide and pull out the jam paper.
d. Reclose the lower guide, upper frame and operation panel.

. *You can use normal paper : ISO A4, about 80g/. (Photocopy type). However, it is suggested to use the paper proposed by the manufacturer : you can have a better printing quality.*

3.6 AC CORD CONNECTION

(1) The power supply is provided as follows:

PUS AC adapter (DC24V, 2.2A) class 1

AC input 220-240V ñ 10., 50/60 Hz

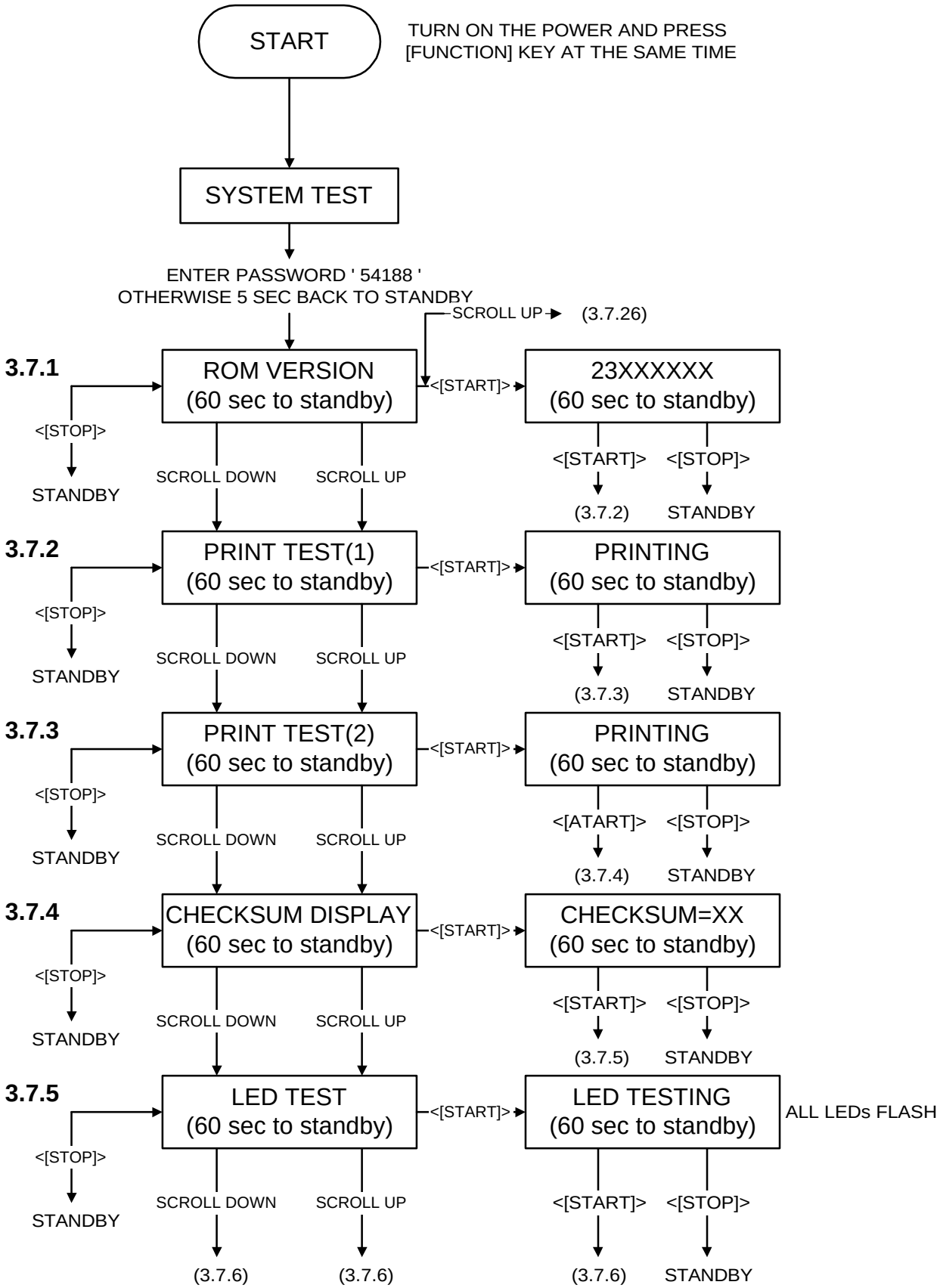
(2) Insert the mains lead into the power inlet on the back panel of the machine.

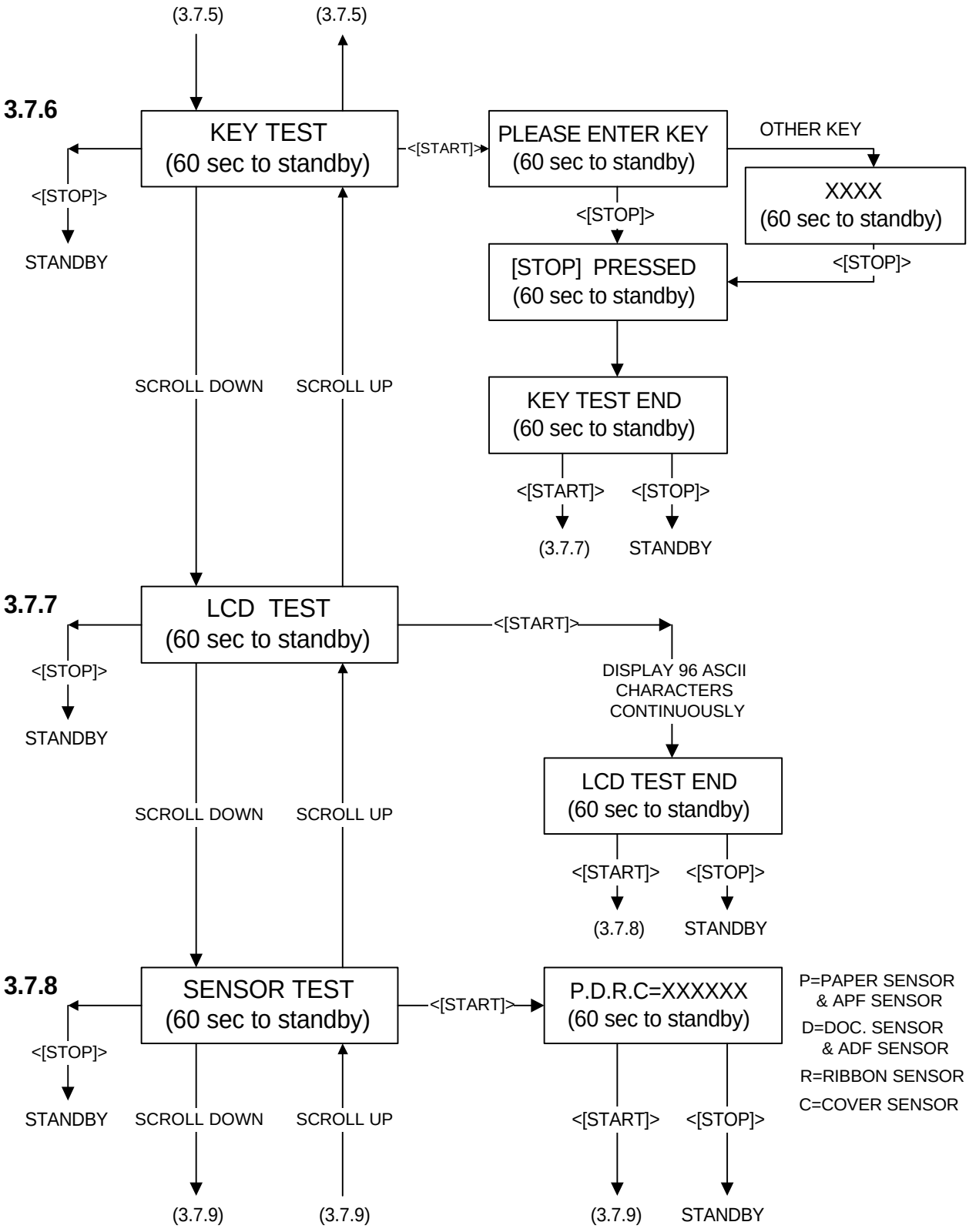
(3) Plug the mains lead into a single wall outlet with a correct power supply, which is near to the unit and is easily accessible.

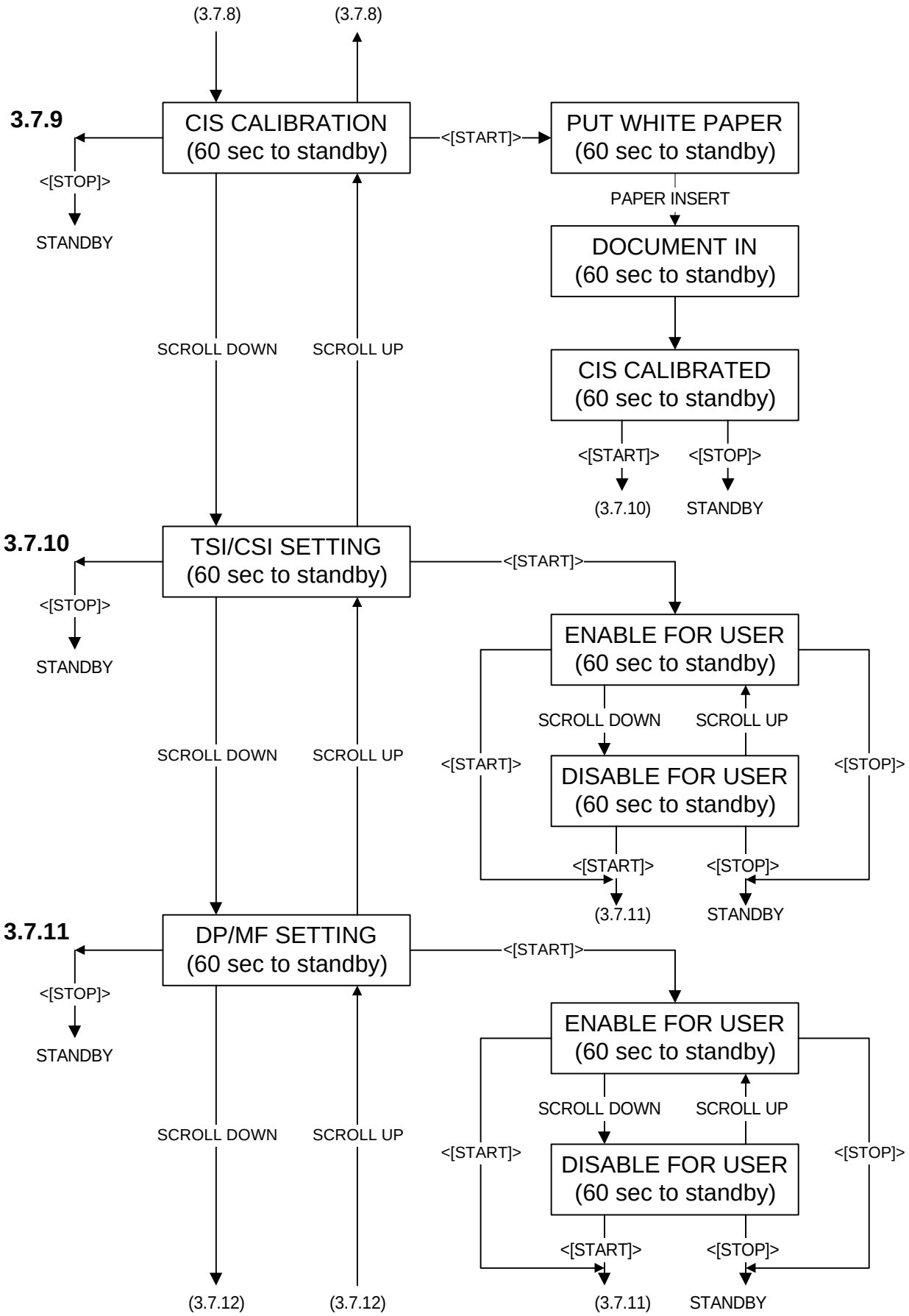
(4) Check that display shows “Date & Time” standby mode.

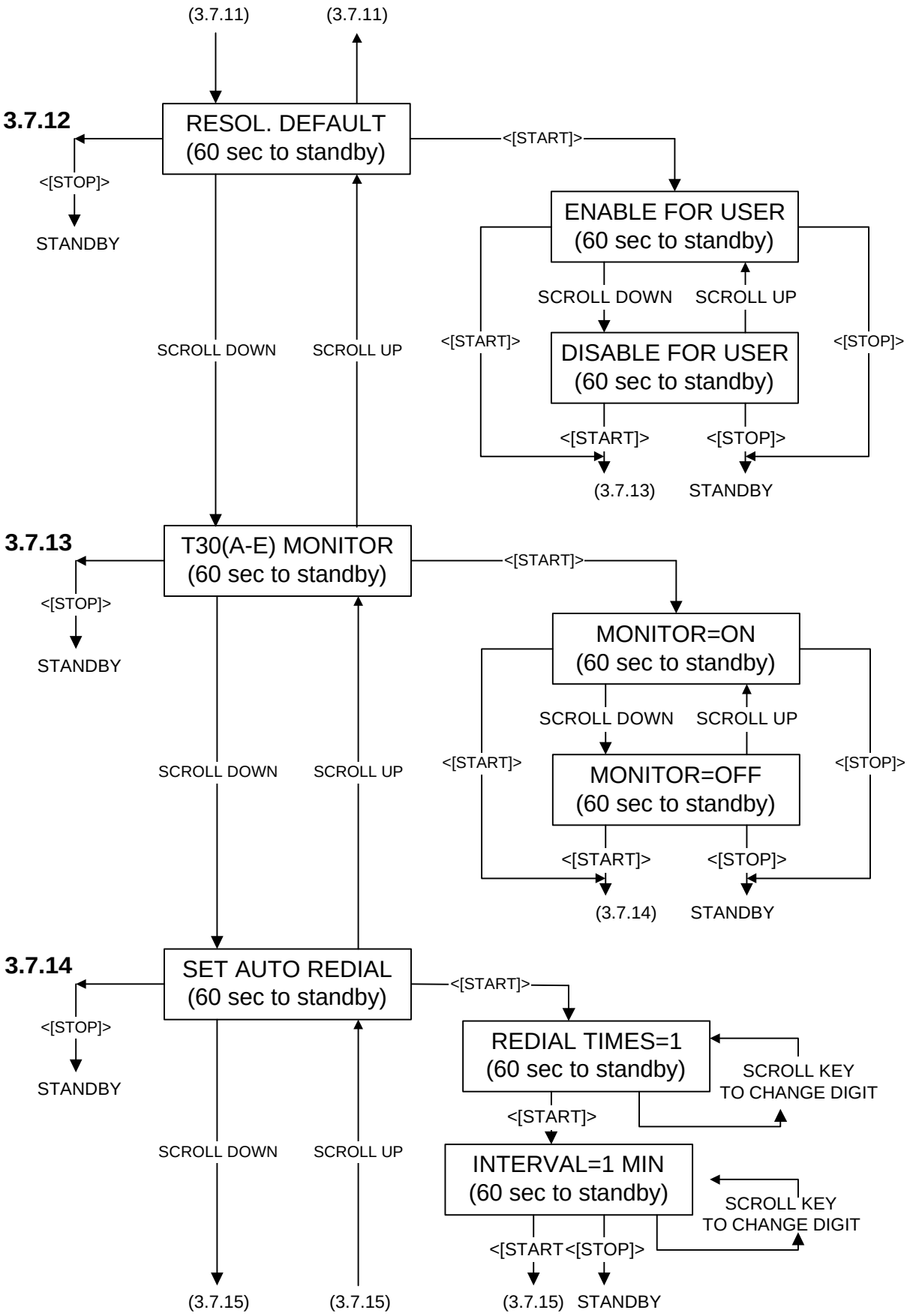
AC POWER INLET
The AC power cord supplied with this machine should be

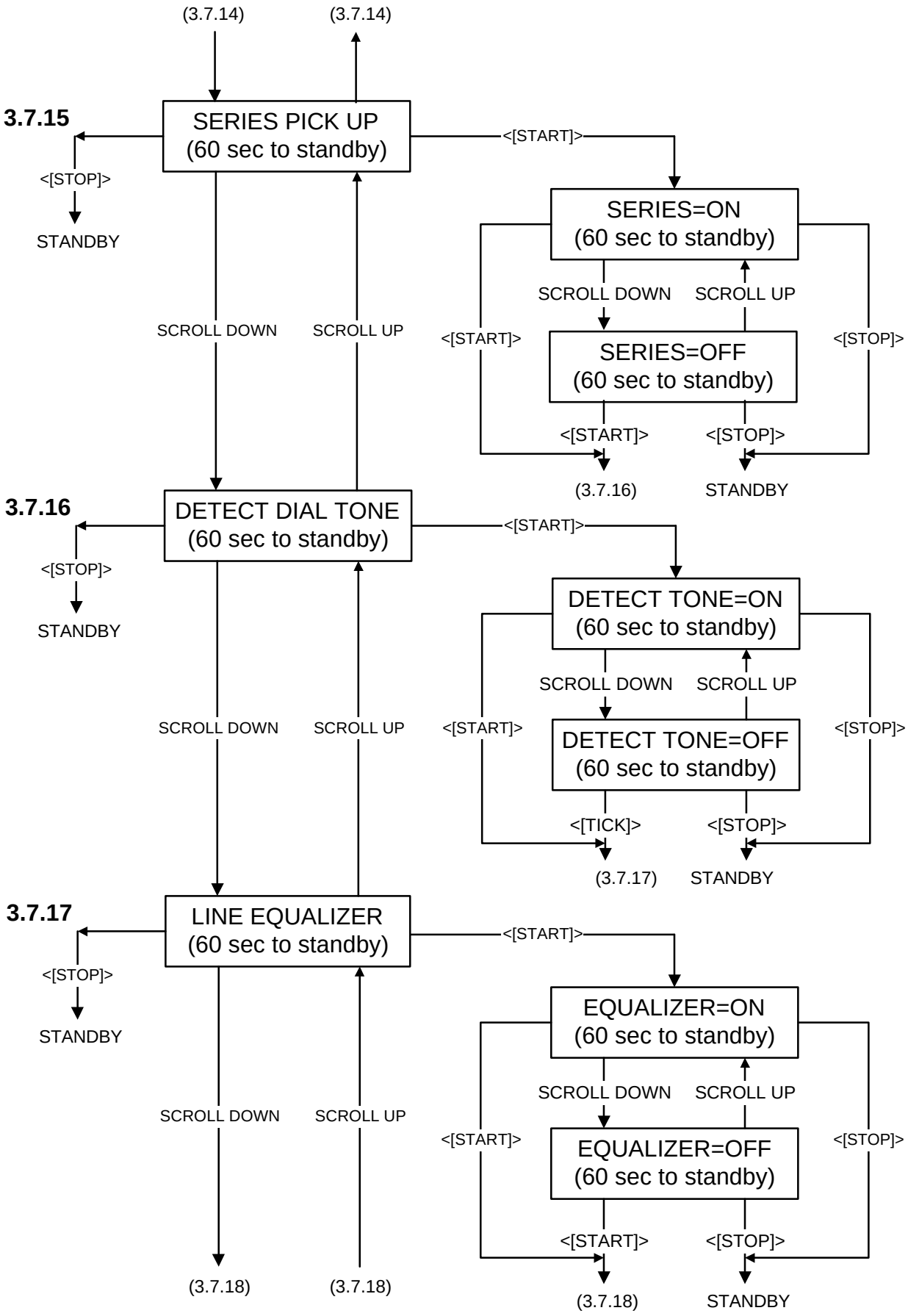
3.7 SYSTEM TEST

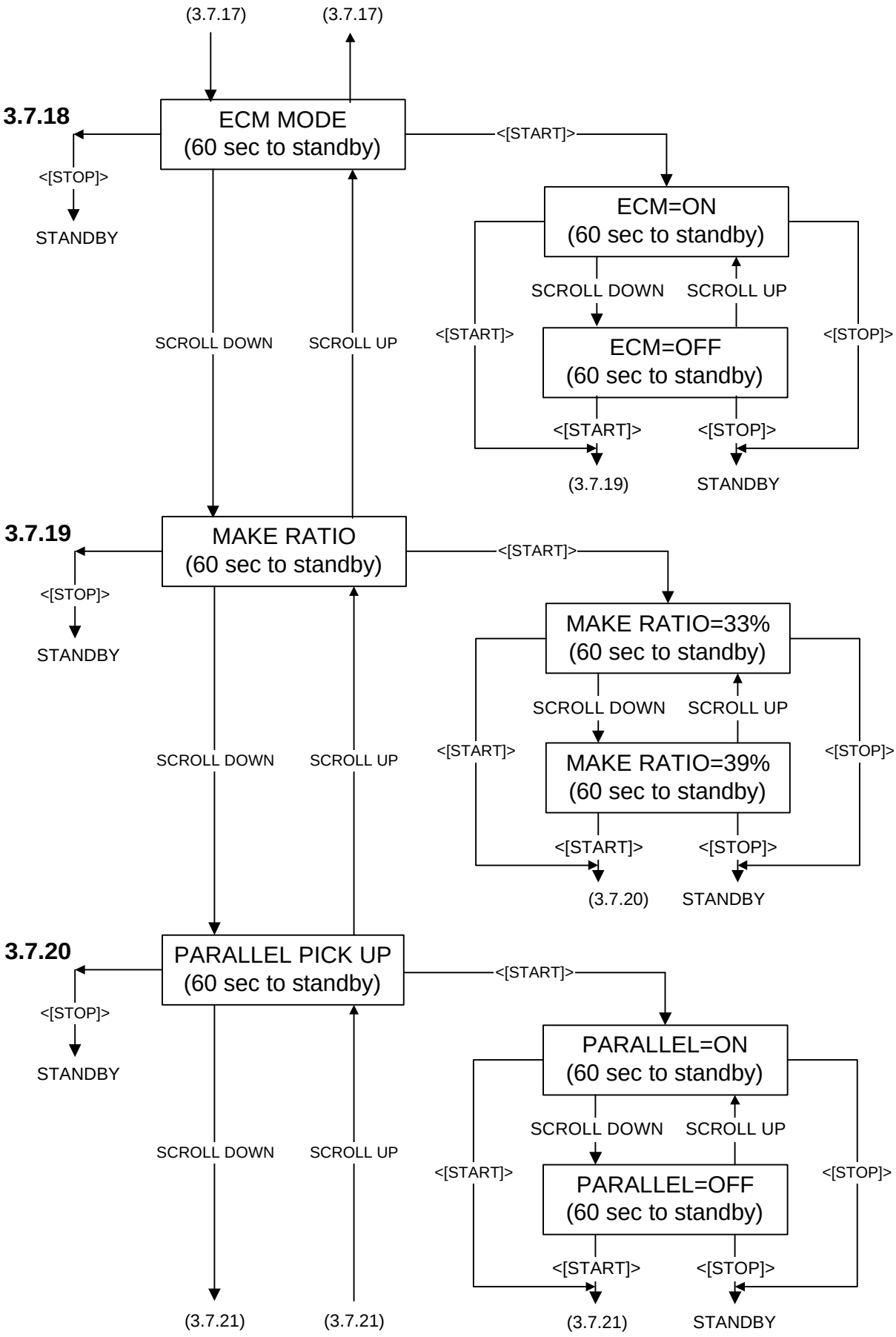


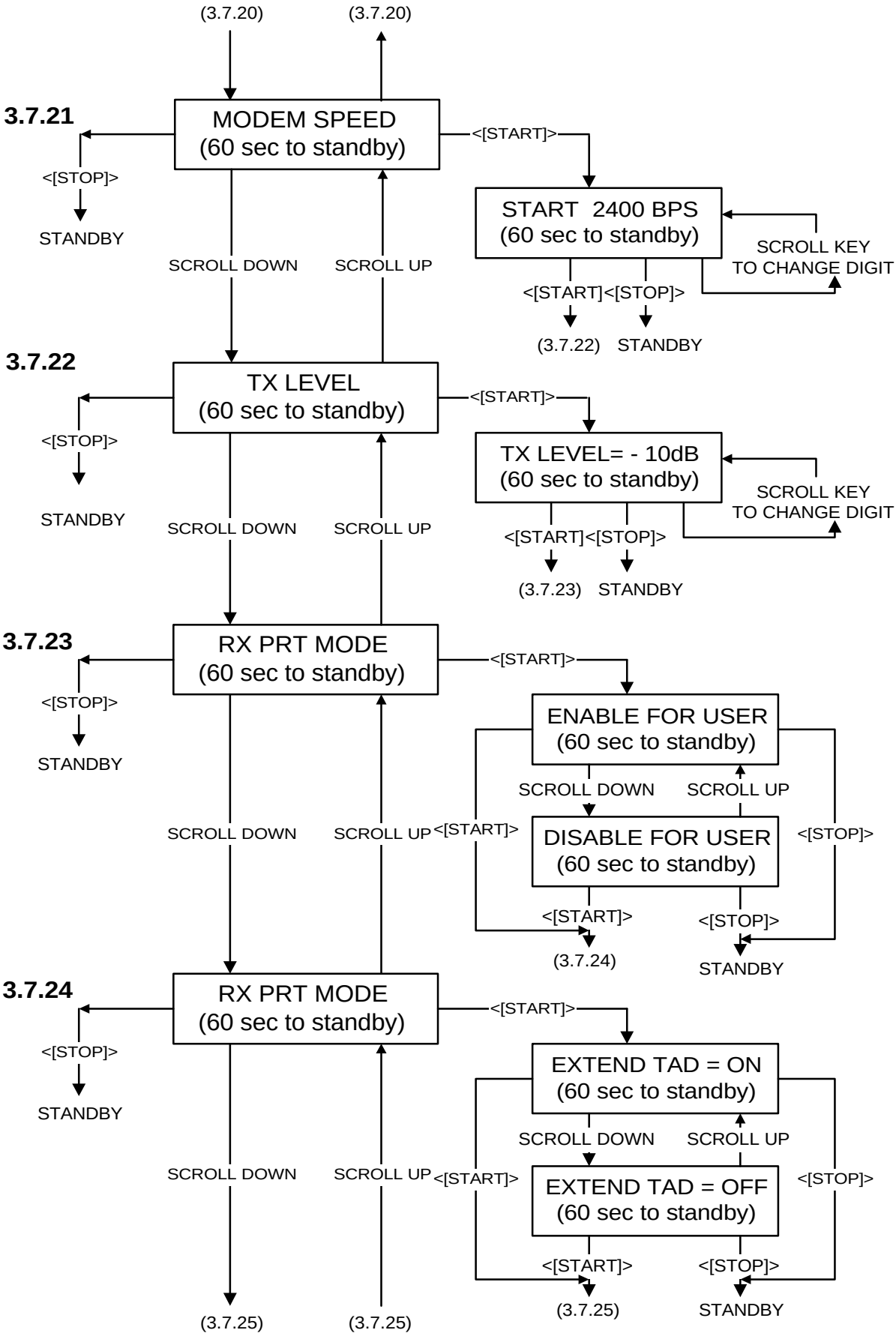

(3.7.5)
(3.7.5)
3.7.6
KEY TEST
(60 sec to standby)
<[START]>
PLEASE ENTER KEY
(60 sec to standby)
OTHER KEY
XXXX
(60 sec to standby)
<[STOP]>
STANDBY
<[STOP]>
[STOP] PRESSED
(60 sec to standby)
<[STOP]>
SCROLL DOWN
SCROLL UP
KEY TEST END
(60 sec to standby)
<[START]>
<[STOP]>
(3.7.7)
STANDBY
3.7.7
LCD TEST
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
DISPLAY 96 ASCII
CHARACTERS
CONTINUOUSLY
SCROLL DOWN
SCROLL UP
LCD TEST END
(60 sec to standby)
<[START]>
<[STOP]>
(3.7.8)
STANDBY
3.7.8
SENSOR TEST
(60 sec to standby)
<[START]>
P.D.R.C=XXXXXX
(60 sec to standby)
P=PAPER SENSOR
& APF SENSOR
D=DOC. SENSOR
& ADF SENSOR
R=RIBBON SENSOR
C=COVER SENSOR
<[STOP]>
STANDBY
SCROLL DOWN
SCROLL UP
<[START]>
<[STOP]>
(3.7.9)
(3.7.9)
(3.7.9)
STANDBY

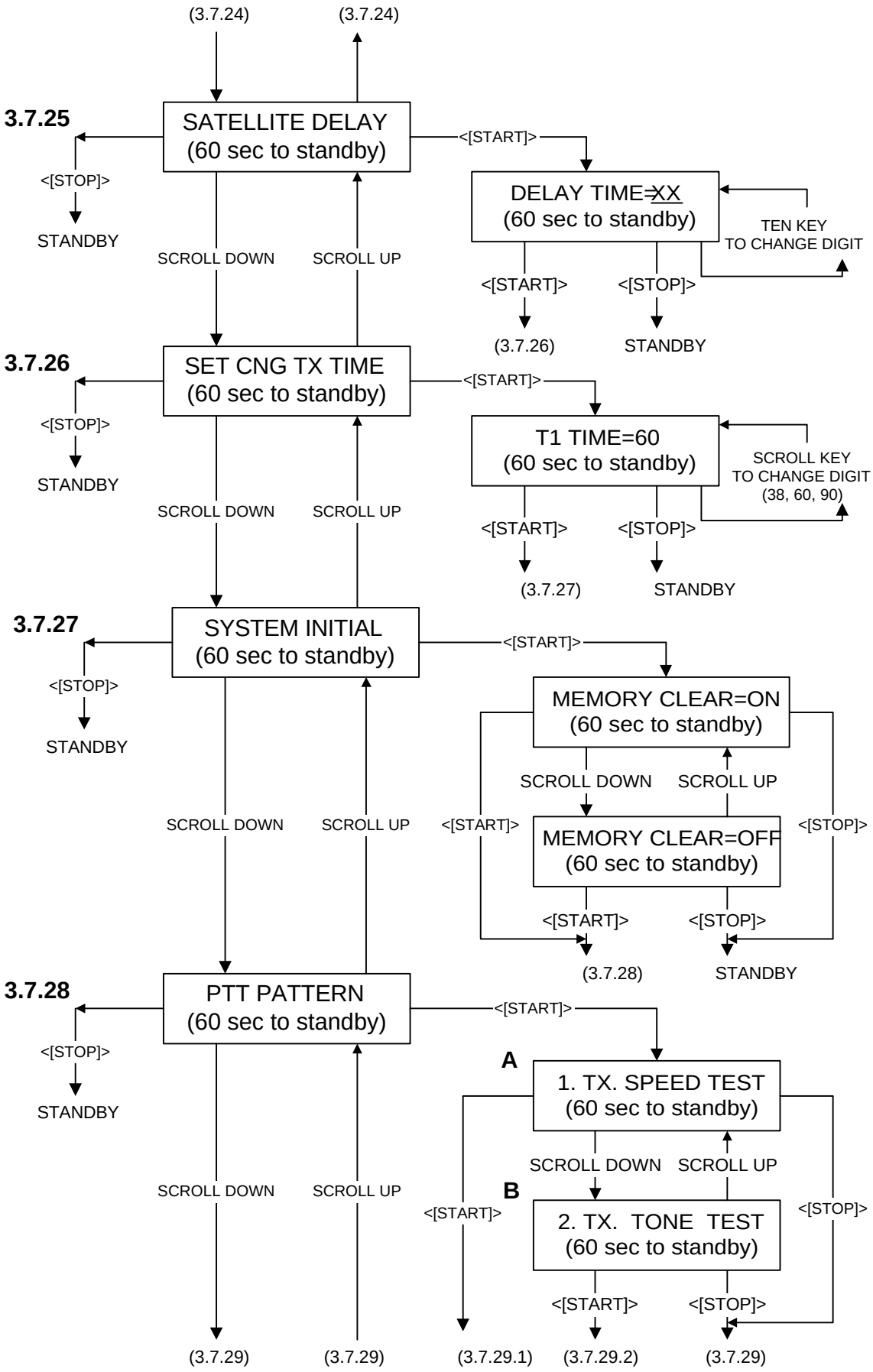

(3.7.8)
(3.7.8)
3.7.9
CIS CALIBRATION
(60 sec to standby)
<[START]>
PUT WHITE PAPER
(60 sec to standby)
<[STOP]>
STANDBY
PAPER INSERT
DOCUMENT IN
(60 sec to standby)
SCROLL DOWN
SCROLL UP
CIS CALIBRATED
(60 sec to standby)
<[START]>
<[STOP]>
(3.7.10)
STANDBY
3.7.10
TSI/CSI SETTING
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
ENABLE FOR USER
(60 sec to standby)
SCROLL DOWN
SCROLL UP
SCROLL DOWN
SCROLL UP
<[START]>
DISABLE FOR USER
(60 sec to standby)
<[STOP]>
<[START]>
<[STOP]>
(3.7.11)
STANDBY
3.7.11
DP/MF SETTING
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
ENABLE FOR USER
(60 sec to standby)
SCROLL DOWN
SCROLL UP
SCROLL DOWN
SCROLL UP
<[START]>
DISABLE FOR USER
(60 sec to standby)
<[STOP]>
<[START]>
<[STOP]>
(3.7.12)
(3.7.12)
(3.7.11)
STANDBY

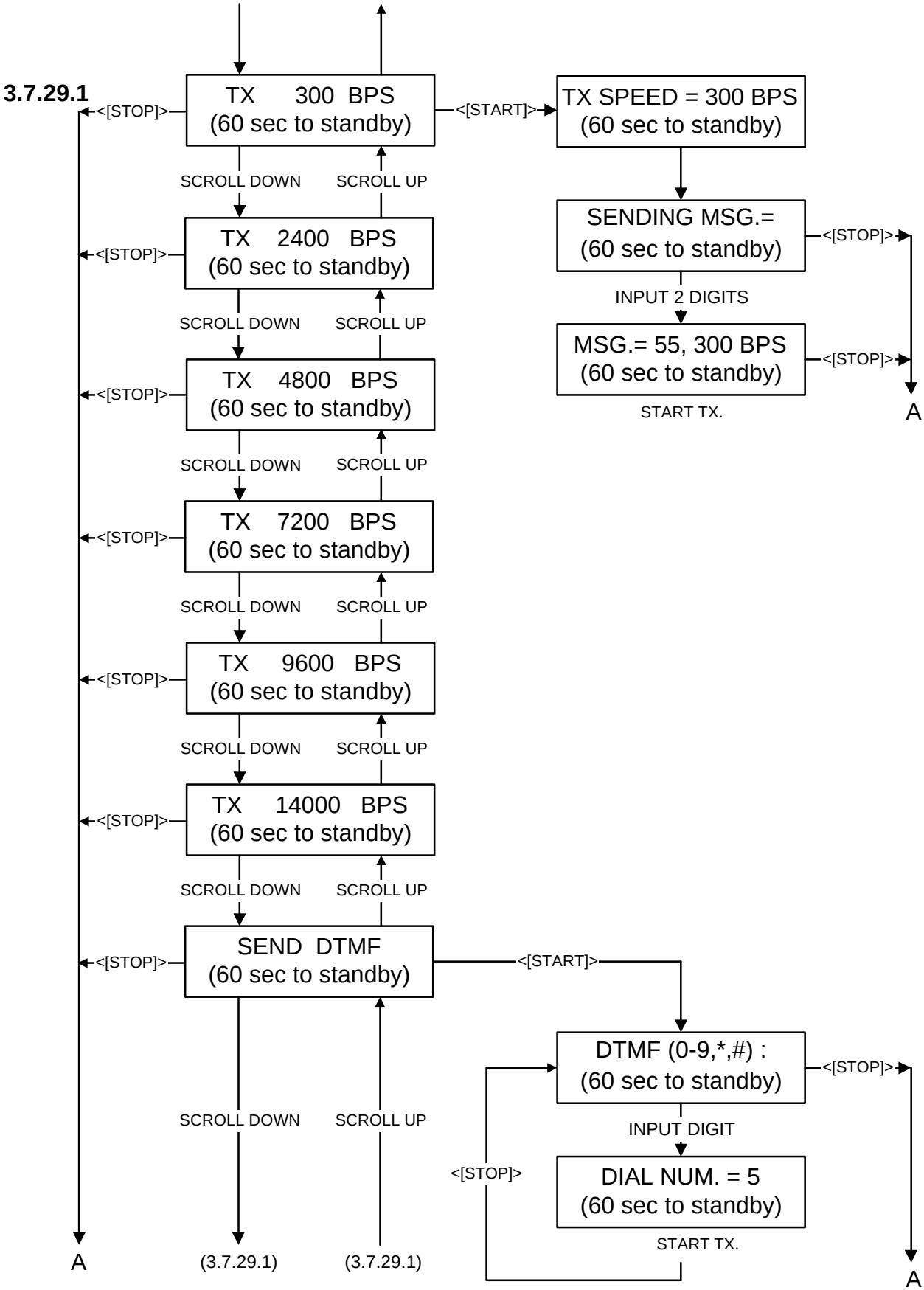

(3.7.11)
(3.7.11)
3.7.12
RESOL. DEFAULT
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
ENABLE FOR USER
(60 sec to standby)
SCROLL DOWN
SCROLL UP
<[START]>
DISABLE FOR USER
(60 sec to standby)
<[STOP]>
SCROLL DOWN
SCROLL UP
<[START]>
<[STOP]>
(3.7.13)
STANDBY
3.7.13
T30(A-E) MONITOR
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
MONITOR=ON
(60 sec to standby)
SCROLL DOWN
SCROLL UP
<[START]>
MONITOR=OFF
(60 sec to standby)
<[STOP]>
SCROLL DOWN
SCROLL UP
<[START]>
<[STOP]>
(3.7.14)
STANDBY
3.7.14
SET AUTO REDIAL
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
REDIAL TIMES=1
(60 sec to standby)
SCROLL KEY
TO CHANGE DIGIT
<[START]>
INTERVAL=1 MIN
(60 sec to standby)
SCROLL KEY
TO CHANGE DIGIT
SCROLL DOWN
SCROLL UP
<[START
<[STOP]>
(3.7.15)
(3.7.15)
(3.7.15)
STANDBY

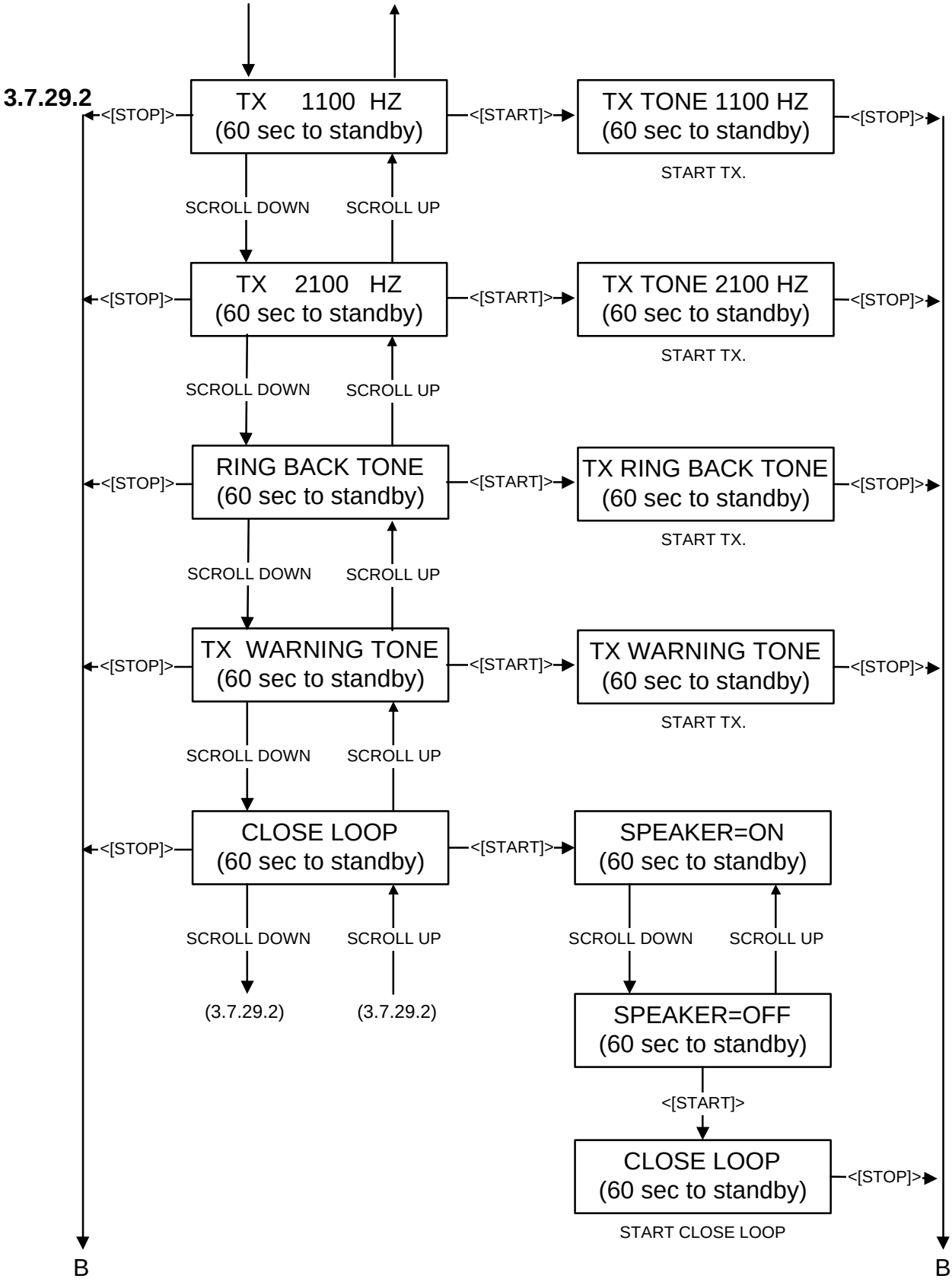

(3.7.14)
(3.7.14)
3.7.15
SERIES PICK UP
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
SERIES=ON
(60 sec to standby)
SCROLL DOWN
SCROLL UP
SCROLL DOWN
SCROLL UP
<[START]>
SERIES=OFF
(60 sec to standby)
<[STOP]>
<[START]>
<[STOP]>
(3.7.16)
STANDBY
3.7.16
DETECT DIAL TONE
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
DETECT TONE=ON
(60 sec to standby)
SCROLL DOWN
SCROLL UP
SCROLL DOWN
SCROLL UP
<[START]>
DETECT TONE=OFF
(60 sec to standby)
<[STOP]>
<[TICK]>
<[STOP]>
(3.7.17)
STANDBY
3.7.17
LINE EQUALIZER
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
EQUALIZER=ON
(60 sec to standby)
SCROLL DOWN
SCROLL UP
SCROLL DOWN
SCROLL UP
<[START]>
EQUALIZER=OFF
(60 sec to standby)
<[STOP]>
<[START]>
<[STOP]>
(3.7.18)
(3.7.18)
(3.7.18)
STANDBY

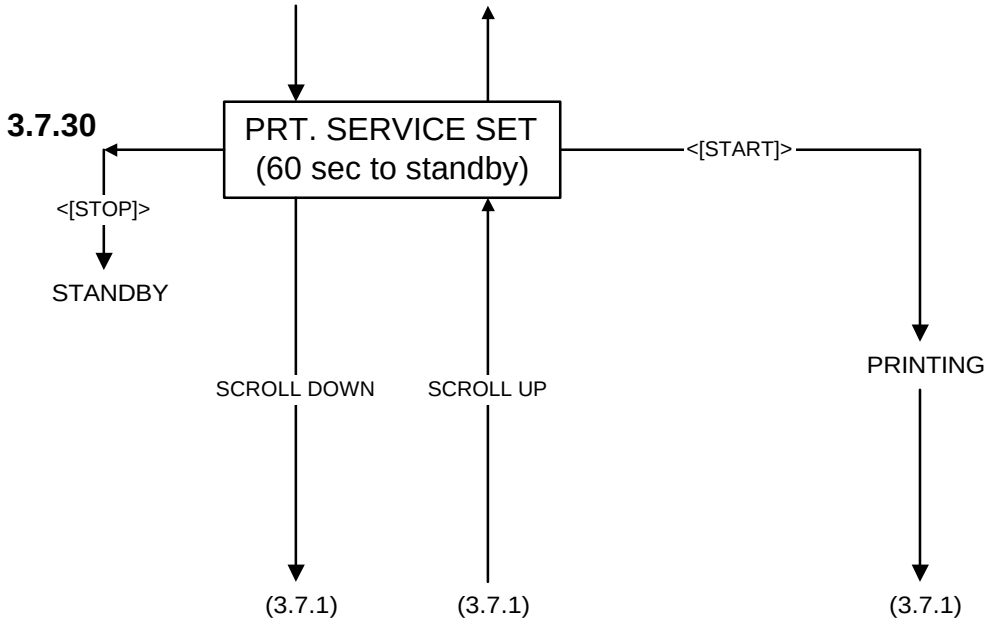

(3.7.17)
(3.7.17)
3.7.18
ECM MODE
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
ECM=ON
(60 sec to standby)
SCROLL DOWN
SCROLL UP
<[START]>
<[STOP]>
ECM=OFF
(60 sec to standby)
<[START]>
<[STOP]>
(3.7.19)
STANDBY
SCROLL DOWN
SCROLL UP
3.7.19
MAKE RATIO
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
MAKE RATIO=33%
(60 sec to standby)
SCROLL DOWN
SCROLL UP
<[START]>
<[STOP]>
MAKE RATIO=39%
(60 sec to standby)
<[START]>
<[STOP]>
(3.7.20)
STANDBY
SCROLL DOWN
SCROLL UP
3.7.20
PARALLEL PICK UP
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
PARALLEL=ON
(60 sec to standby)
SCROLL DOWN
SCROLL UP
<[START]>
<[STOP]>
PARALLEL=OFF
(60 sec to standby)
<[START]>
<[STOP]>
(3.7.21)
STANDBY
SCROLL DOWN
SCROLL UP
(3.7.21)
(3.7.21)


(3.7.20)
(3.7.20)
3.7.21
MODEM SPEED
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
START 2400 BPS
(60 sec to standby)
SCROLL KEY
TO CHANGE DIGIT
SCROLL DOWN
SCROLL UP
<[START]<[STOP]>
(3.7.22)
STANDBY
3.7.22
TX LEVEL
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
TX LEVEL= - 10dB
(60 sec to standby)
SCROLL KEY
TO CHANGE DIGIT
SCROLL DOWN
SCROLL UP
<[START]<[STOP]>
(3.7.23)
STANDBY
3.7.23
RX PRT MODE
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
ENABLE FOR USER
(60 sec to standby)
SCROLL DOWN
SCROLL UP
SCROLL DOWN
SCROLL UP
<[START]>
DISABLE FOR USER
(60 sec to standby)
<[STOP]>
<[START]>
<[STOP]>
(3.7.24)
STANDBY
3.7.24
RX PRT MODE
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
EXTEND TAD = ON
(60 sec to standby)
SCROLL DOWN
SCROLL UP
SCROLL DOWN
SCROLL UP
<[START]>
EXTEND TAD = OFF
(60 sec to standby)
<[STOP]>
<[START]>
<[STOP]>
(3.7.25)
STANDBY
(3.7.25)
(3.7.25)


(3.7.24)
(3.7.24)
3.7.25
SATELLITE DELAY
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
SCROLL DOWN
SCROLL UP
DELAY TIME=XX
(60 sec to standby)
TEN KEY
TO CHANGE DIGIT
<[START]>
<[STOP]>
(3.7.26)
STANDBY
3.7.26
SET CNG TX TIME
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
SCROLL DOWN
SCROLL UP
T1 TIME=60
(60 sec to standby)
SCROLL KEY
TO CHANGE DIGIT
(38, 60, 90)
<[START]>
<[STOP]>
(3.7.27)
STANDBY
3.7.27
SYSTEM INITIAL
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
SCROLL DOWN
SCROLL UP
MEMORY CLEAR=ON
(60 sec to standby)
SCROLL DOWN
SCROLL UP
<[START]>
MEMORY CLEAR=OFF
(60 sec to standby)
<[STOP]>
<[START]>
<[STOP]>
(3.7.28)
STANDBY
3.7.28
PTT PATTERN
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
A
1. TX. SPEED TEST
(60 sec to standby)
SCROLL DOWN
SCROLL UP
B
2. TX. TONE TEST
(60 sec to standby)
SCROLL DOWN
SCROLL UP
<[START]>
<[STOP]>
<[START]>
<[STOP]>
(3.7.29)
(3.7.29)
(3.7.29.1)
(3.7.29.2)
(3.7.29)


3.7.29.1
TX 300 BPS
(60 sec to standby)
<[STOP]>
<[START]>
TX SPEED = 300 BPS
(60 sec to standby)
SCROLL DOWN
SCROLL UP
TX 2400 BPS
(60 sec to standby)
SENDING MSG.=
(60 sec to standby)
INPUT 2 DIGITS
MSG.= 55, 300 BPS
(60 sec to standby)
START TX.
A
TX 4800 BPS
(60 sec to standby)
TX 7200 BPS
(60 sec to standby)
TX 9600 BPS
(60 sec to standby)
TX 14000 BPS
(60 sec to standby)
SEND DTMF
(60 sec to standby)
DTMF (0-9,*,#) :
(60 sec to standby)
INPUT DIGIT
DIAL NUM. = 5
(60 sec to standby)
START TX.
(3.7.29.1)
(3.7.29.1)


3.7.29.2
TX 1100 HZ
(60 sec to standby)
<[STOP]>
<[START]>
TX TONE 1100 HZ
(60 sec to standby)
<[STOP]>
START TX.
SCROLL DOWN
SCROLL UP
TX 2100 HZ
(60 sec to standby)
<[STOP]>
<[START]>
TX TONE 2100 HZ
(60 sec to standby)
<[STOP]>
START TX.
SCROLL DOWN
SCROLL UP
RING BACK TONE
(60 sec to standby)
<[STOP]>
<[START]>
TX RING BACK TONE
(60 sec to standby)
<[STOP]>
START TX.
SCROLL DOWN
SCROLL UP
TX WARNING TONE
(60 sec to standby)
<[STOP]>
<[START]>
TX WARNING TONE
(60 sec to standby)
<[STOP]>
START TX.
SCROLL DOWN
SCROLL UP
CLOSE LOOP
(60 sec to standby)
<[STOP]>
<[START]>
SPEAKER=ON
(60 sec to standby)
SCROLL DOWN
SCROLL UP
(3.7.29.2)
(3.7.29.2)
SCROLL DOWN
SCROLL UP
SPEAKER=OFF
(60 sec to standby)
<[START]>
CLOSE LOOP
(60 sec to standby)
<[STOP]>
START CLOSE LOOP
B
B


3.7.30
PRT. SERVICE SET
(60 sec to standby)
<[START]>
<[STOP]>
STANDBY
PRINTING
SCROLL DOWN
SCROLL UP
(3.7.1)
(3.7.1)
(3.7.1)

CHAPTER 4

MAINTENANCE

4.1 ROUTINE INSPECTION

Basically, the routine inspection of following items is performed about every one year after the machine is installed. The description of routine inspection is shown in table 4.1.1.

Table 4.1.1 Routine Inspection

NO.	Inspection Item	Procedure	Remarks
1.	**I.S. roller**	Clean with ethyl alcohol.	Figure 4.1.1
2	**A.D.F. roller** **A.P.F. roller** **Feed roller**	Clean with ethyl alcohol.	Figure 4.1.1 Figure 4.1.2
3	**T.P.H. roller**	Clean with ethyl alcohol.	Figure 4.1.3
4	**Separation rubber pad** **(A.P.F.)** **(A.D.F.)**	Clean with warm or cold water. If this rubber is worn out, replace this rubber.	 Figure 4.1.2 Figure 4.1.1
5	**Thermal Print head** **(T.P.H.)**	Check it for stains of paper dust, etc. Clean it with ethyl alcohol, if necessary.	Figure 4.1.4
6	**Contact Image Scanner** **(C.I.S.)**	Check it for stains of paper dust, etc. Clean it with ethyl alcohol, if necessary.	Figure 4.1.1
7	**Microswitch operation** .**Cover switch** .**A.P.F. sensor** .**Paper sensor** .**Ribbon sensor**	Confirm that the LCD shows “COVER OPEN”, when the paper cover opened and that message disappears when the cover closed. The LCD shows “NO PAPER” when runs out of recording paper. The LCD shows “NO RIBBON” when runs out of ribbon roller.	 Figure 4.1.4 Figure 4.1.3 Figure 4.1.2 Figure 4.1.4
8	**Lubrication**	Apply white grease to the drive gears and gear hubs.	
9	**Cleaning**	Remove outside fallen materials, if any, from the machine.	

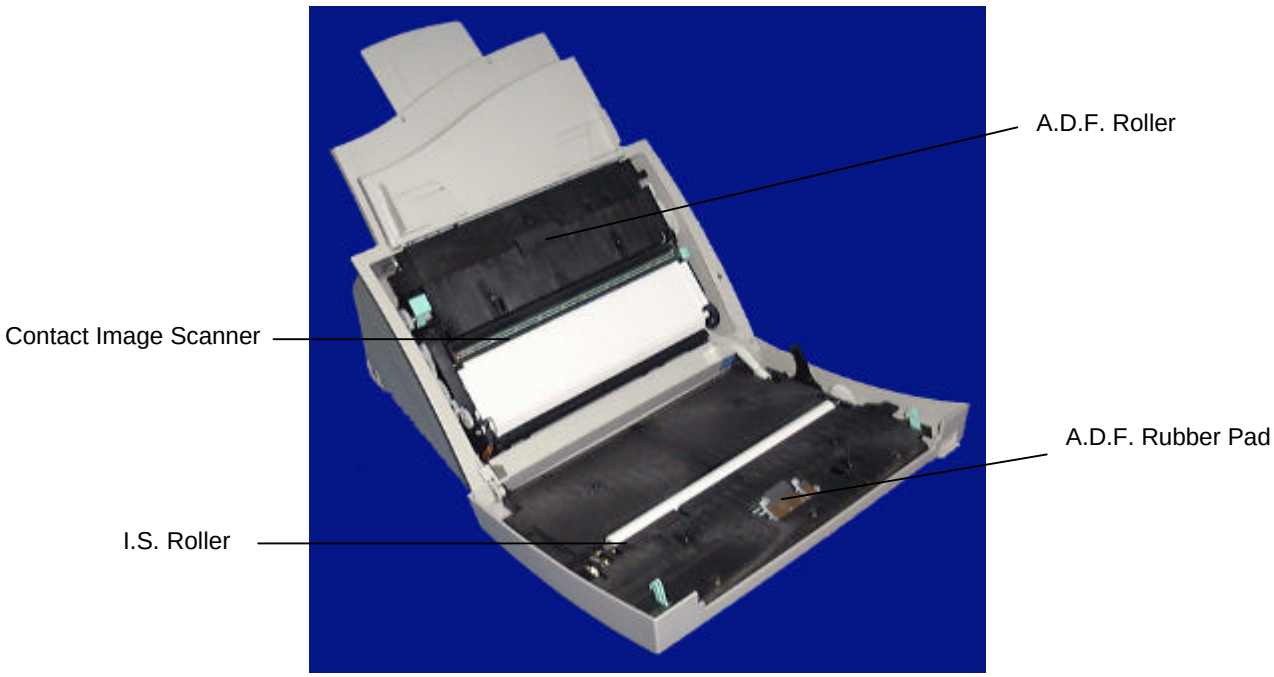


Figure 4.1.1

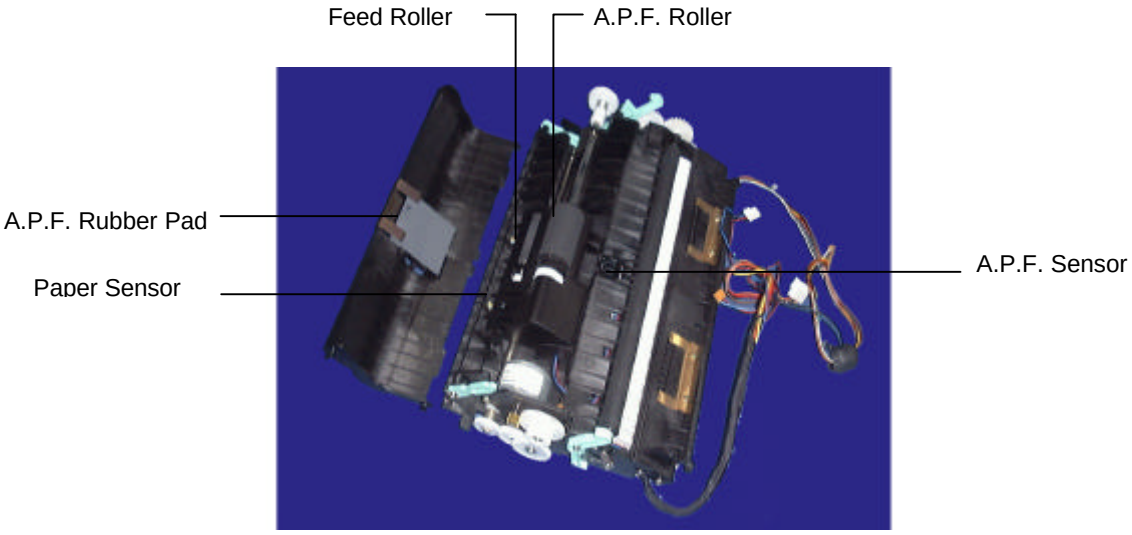


Figure 4.1.2

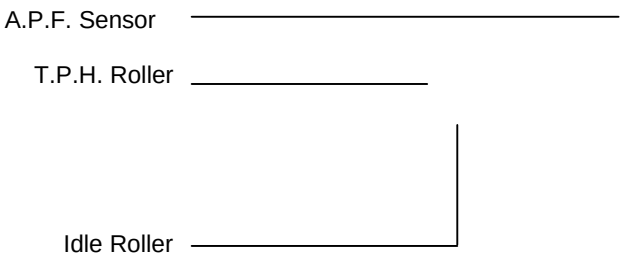


Figure 4.1.3

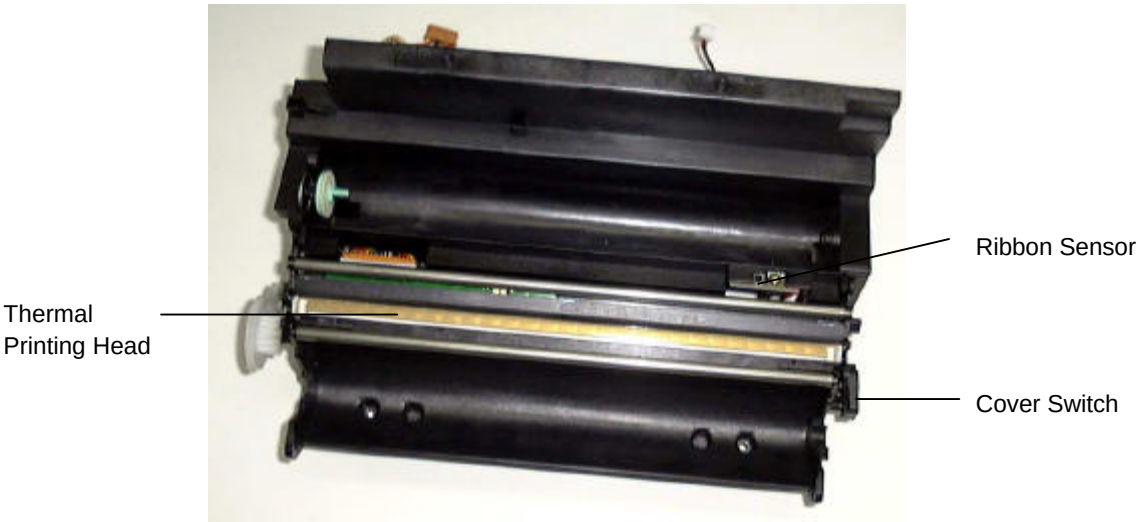
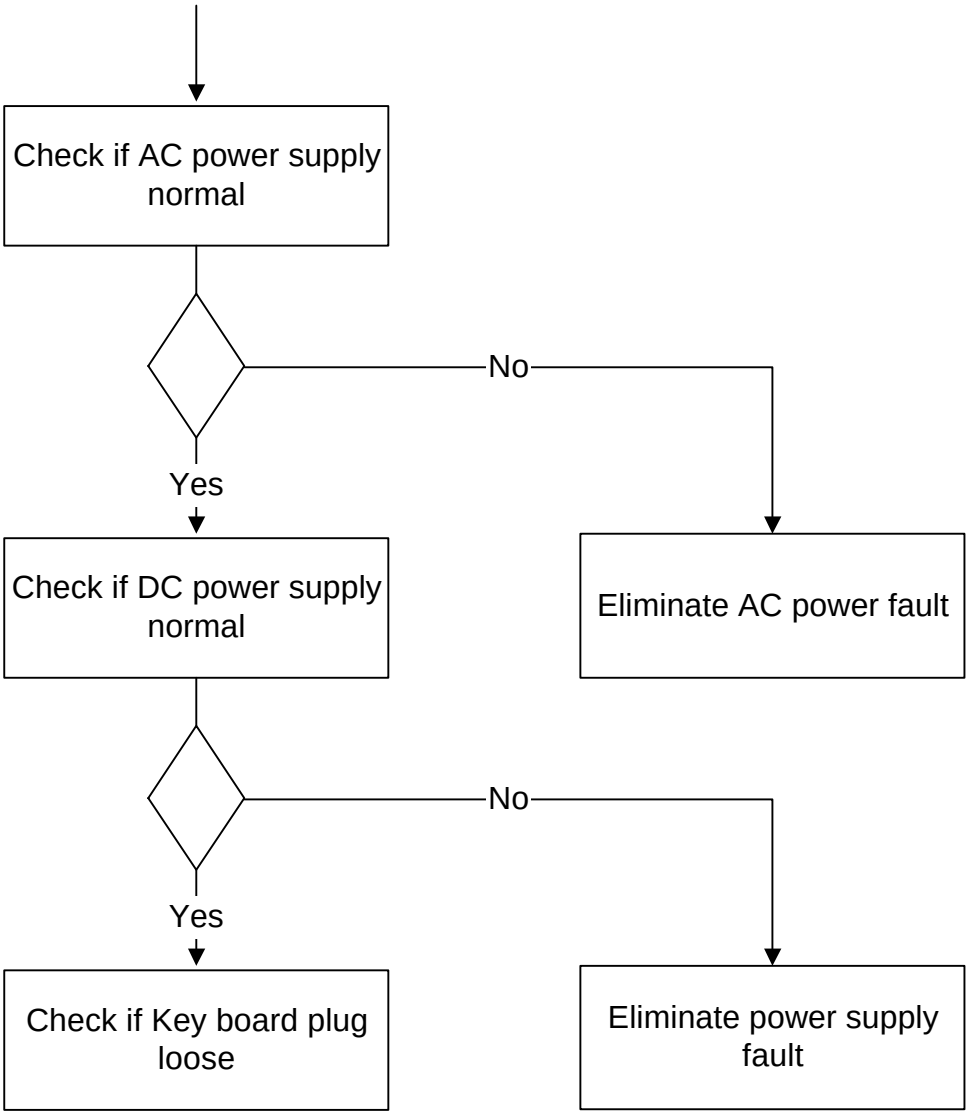


Figure 4.1.4

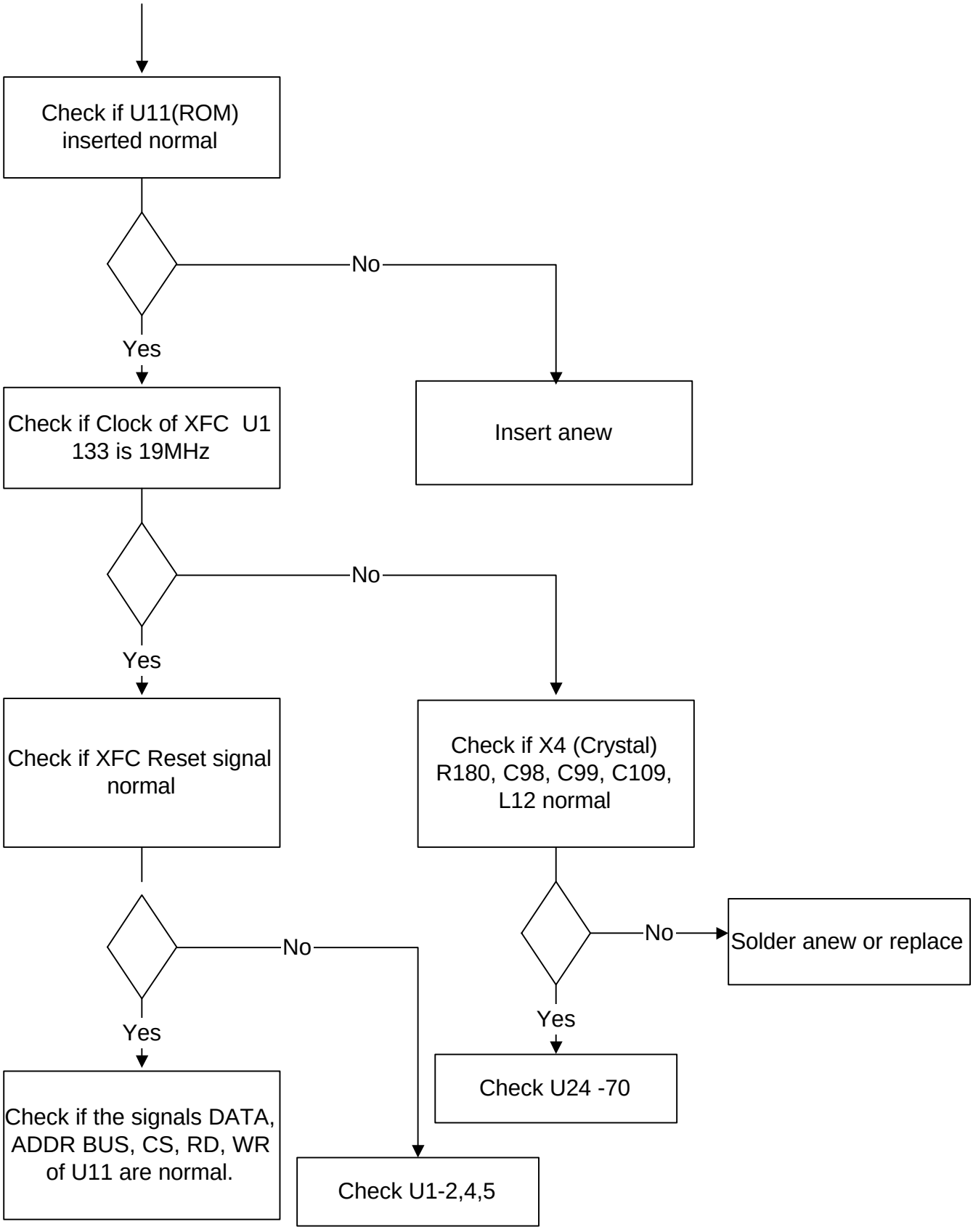
When cleaning the Contact Image Sensor, lift up the scan roller.
When returning the scan roller to the original position, confirm that its plastic bushings of the platen properly set into the grooves of the frame unit and turn the bushings to back then make sure the pin point of tab is tightly inserted to the frame surface.

CHAPTER 5
TROUBLESHOOTING

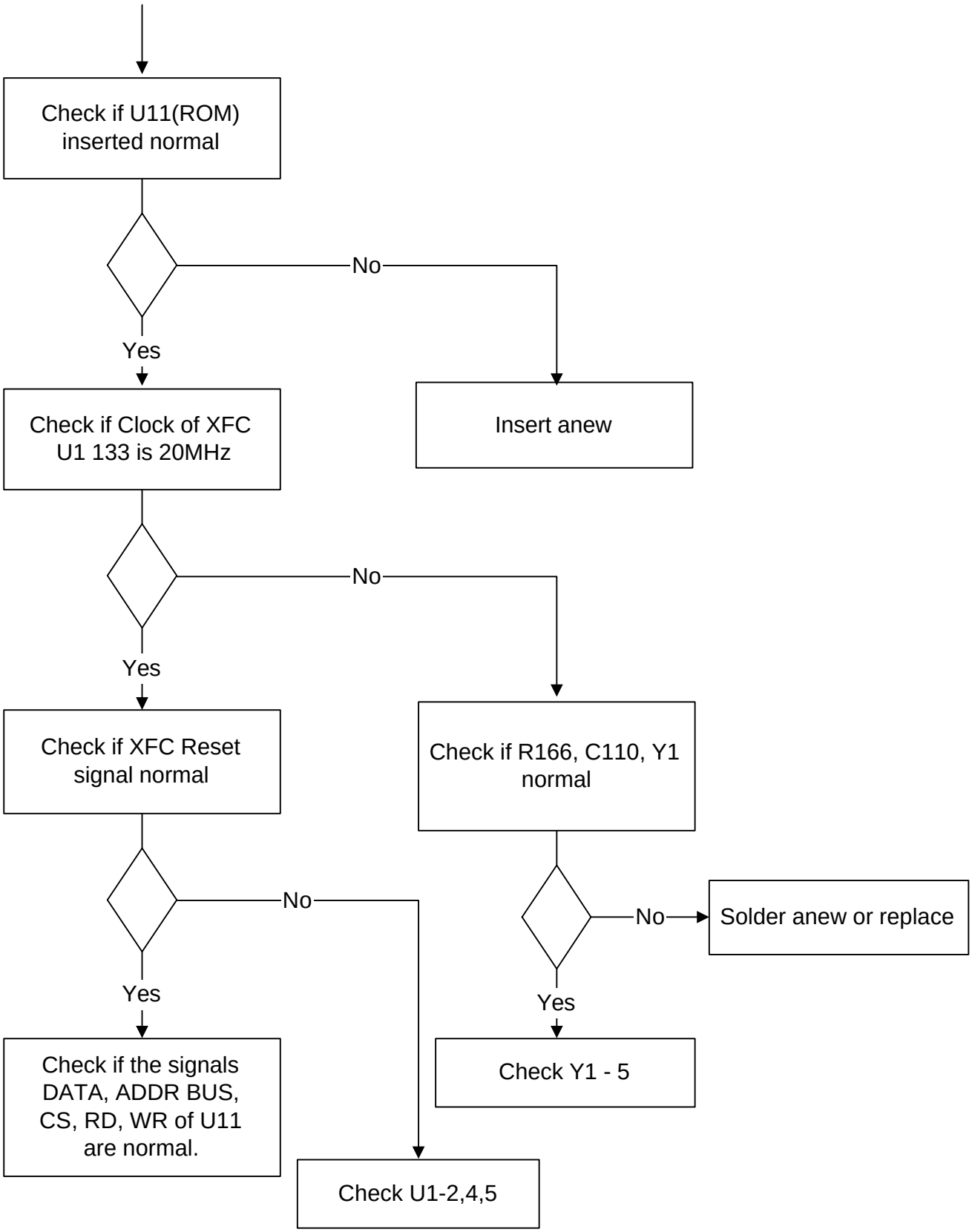
5.1 LCD FAILS TO DISPLAY AFTER POWER ON



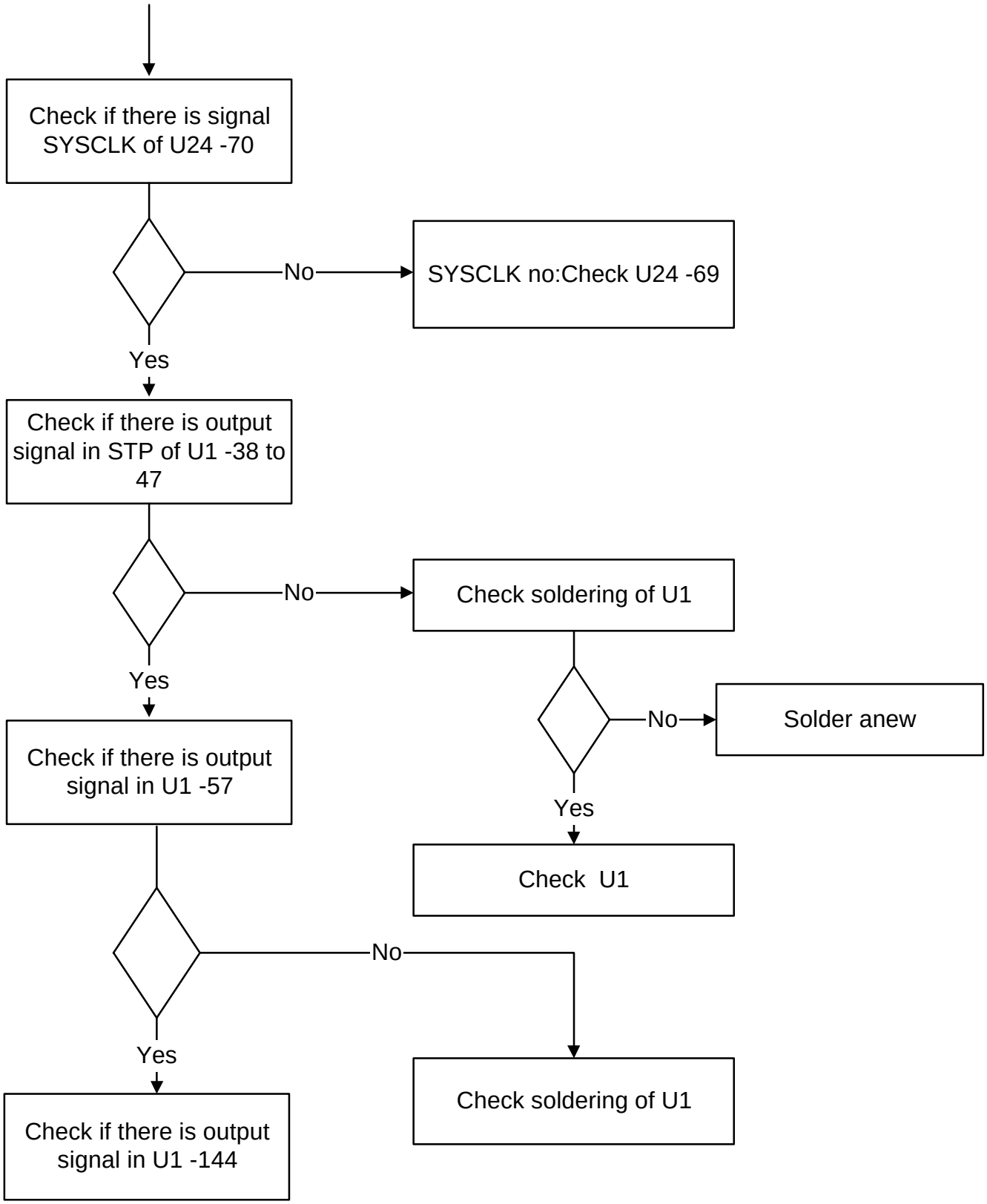
5.2.1. HALF OF LCD DISPLAY FULL BLACK AFTER POWER ON AND KEY FAILED (610 only)



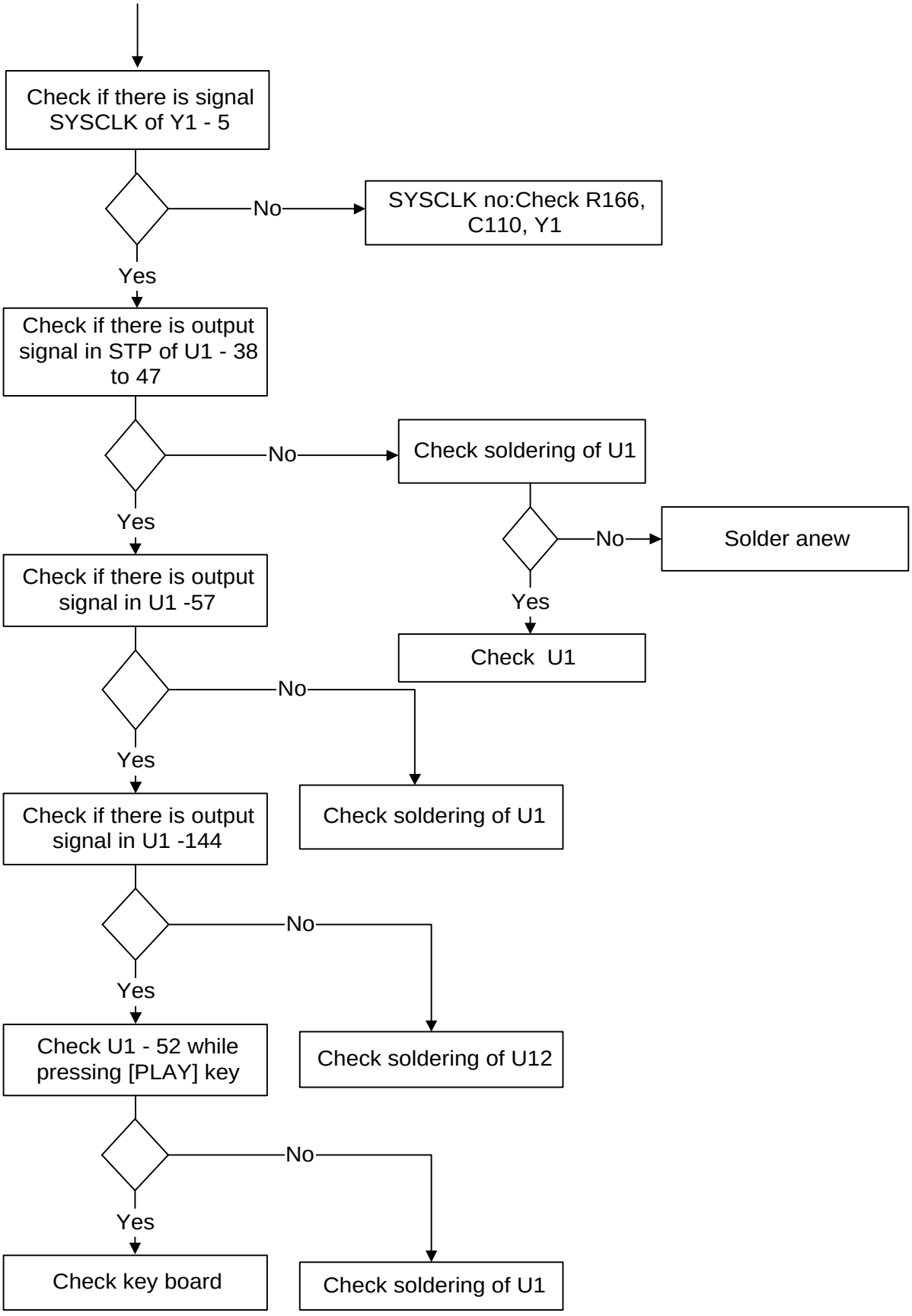
5.2.2. HALF OF LCD DISPLAY FULL BLACK AFTER POWER ON AND KEY FAILED (660 only)



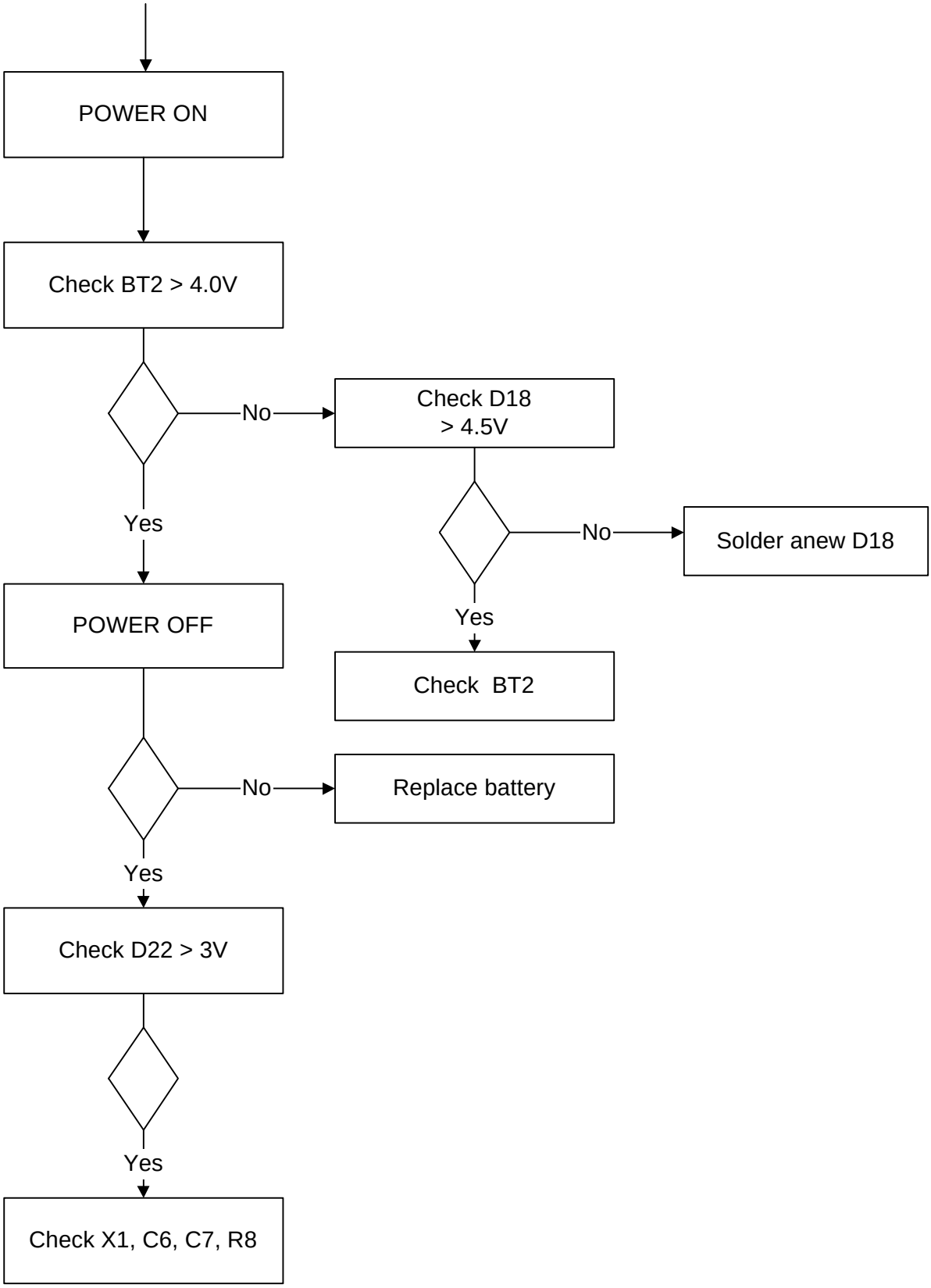
5.3.1.LCD DISPLAY NORMAL ON STARTING BUT KEY FAILED (610 only)



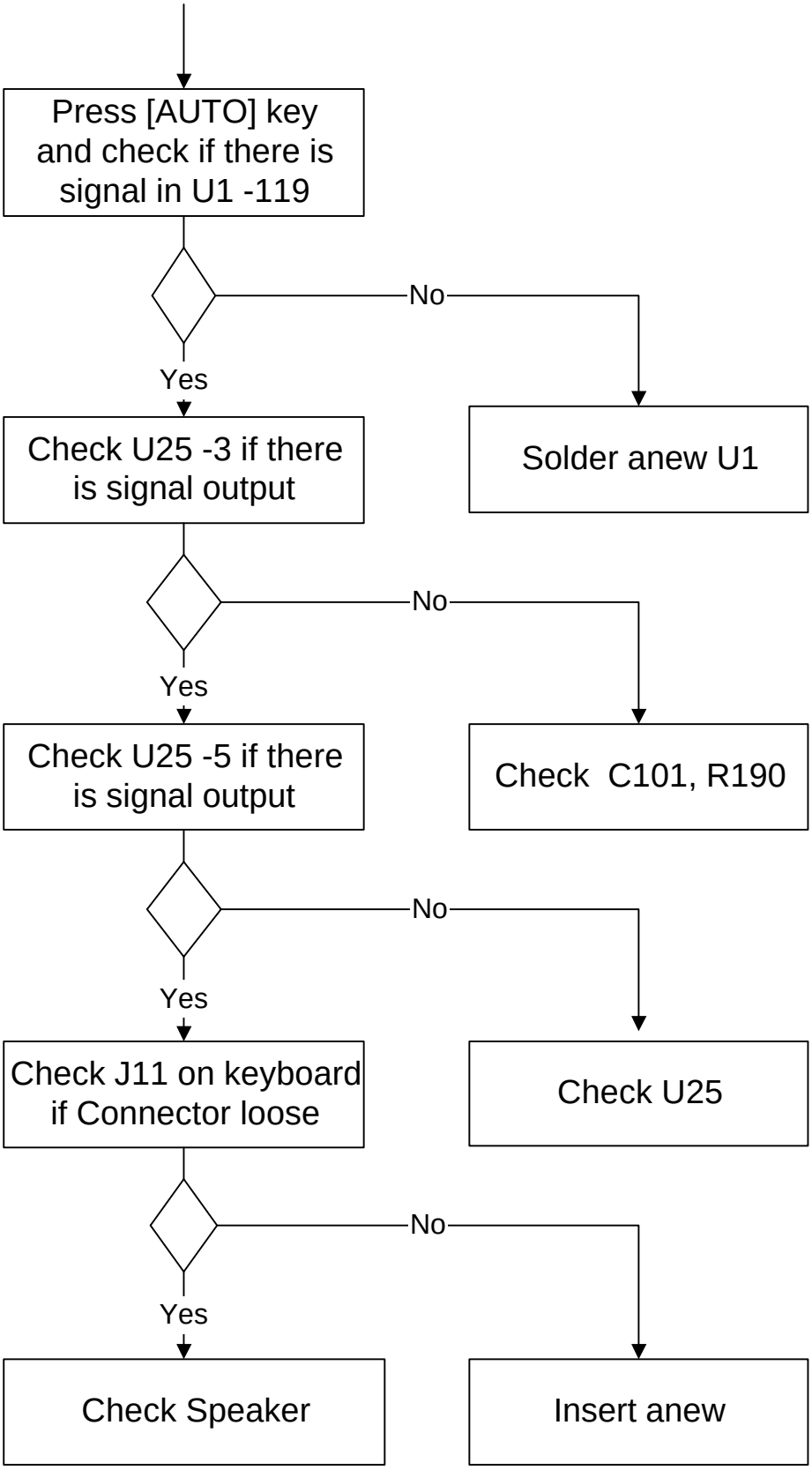
5.3.2.LCD DISPLAY NORMAL ON STARTING BUT KEY FAILED (660 only)



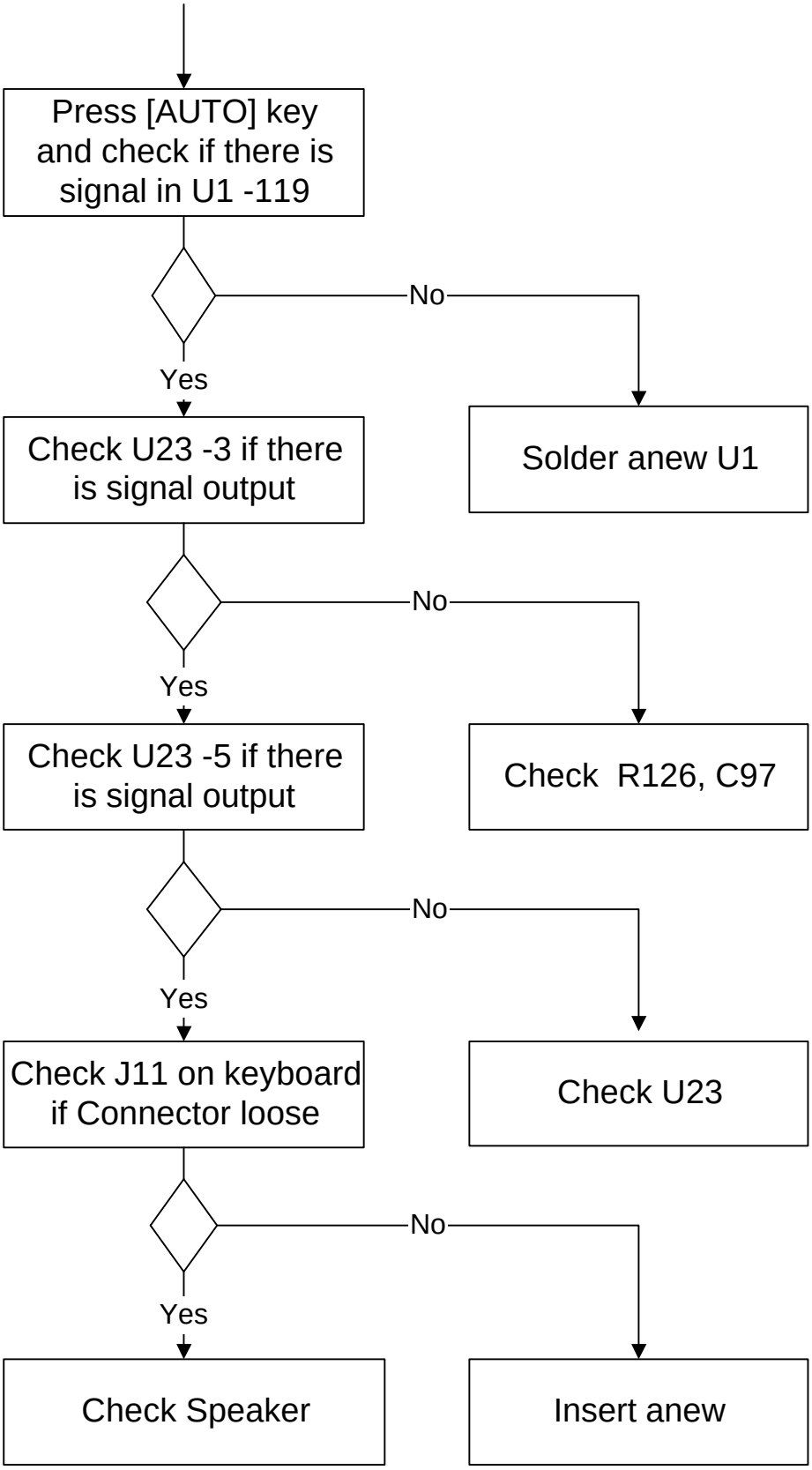
5.4. TIME DISPLAY ABNORMAL



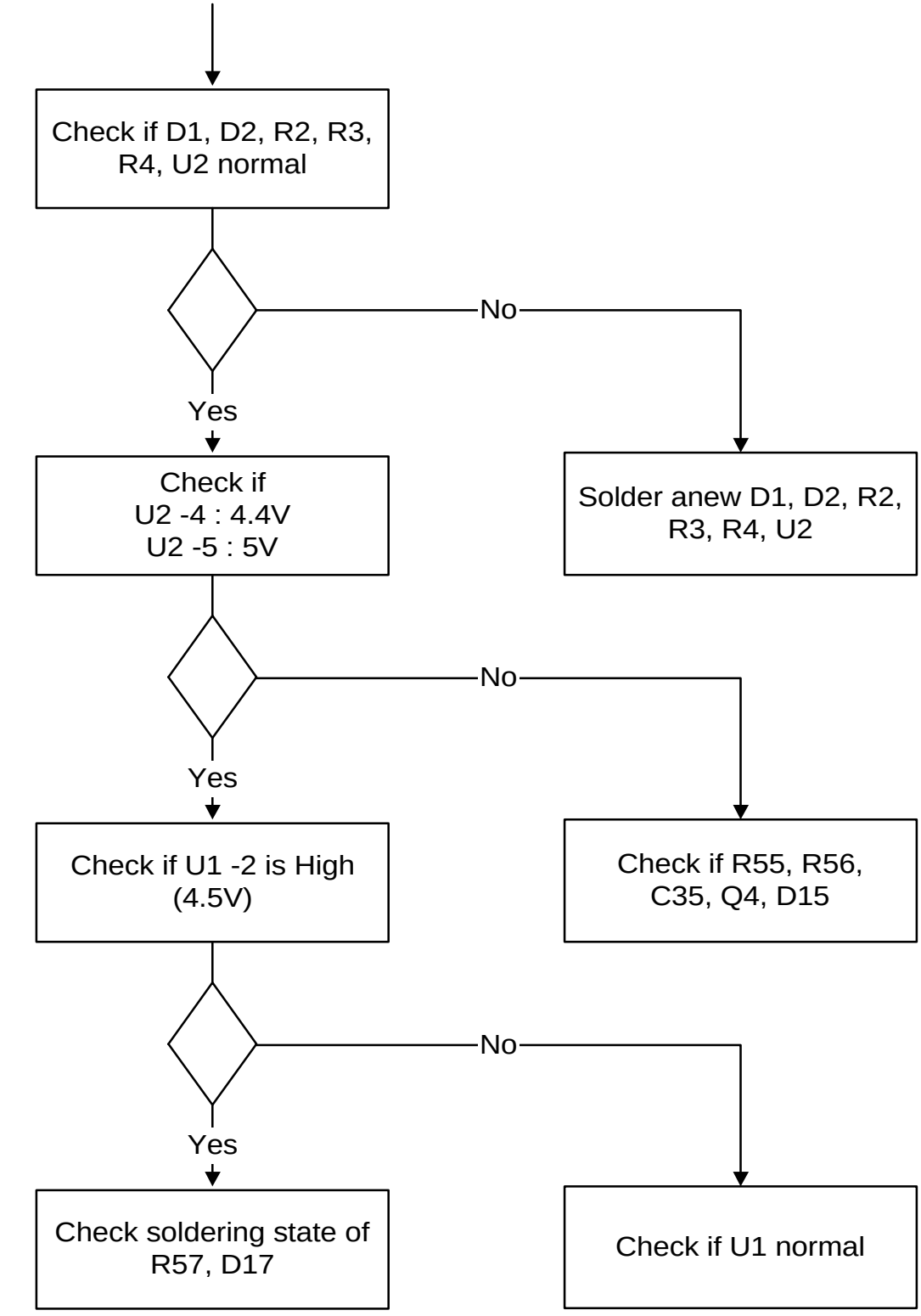
5.5.1 IT WORKS PRESSING KEY BUT SPEAKER REMAINS MUTE (610 only)



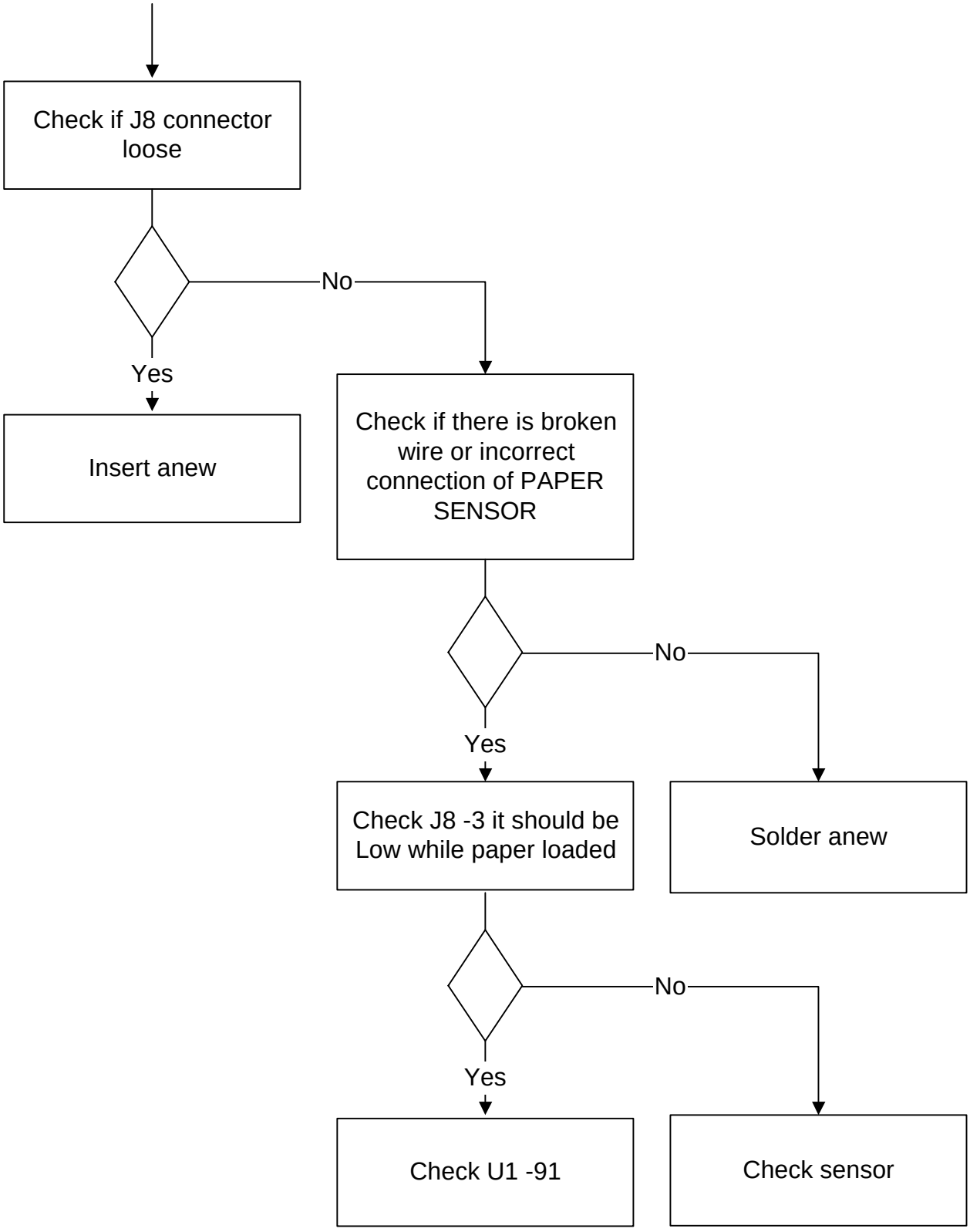
5.5.2.IT WORKS PRESSING KEY BUT SPEAKER REMAINS MUTE (660 only)



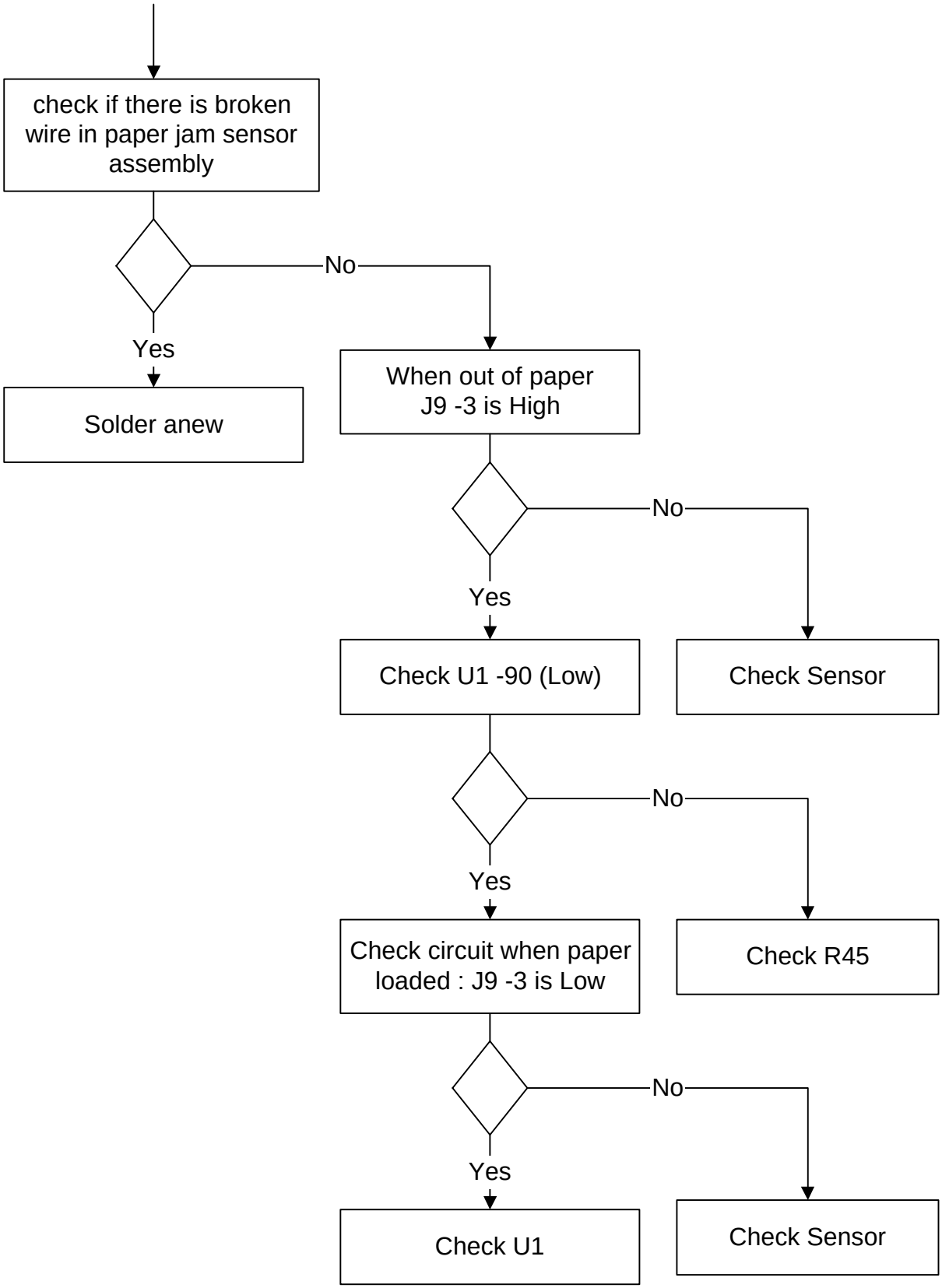
5.6.RESET ON STARTING


Check if D1, D2, R2, R3, R4, U2 normal
No
Yes
Solder anew D1, D2, R2, R3, R4, U2
Check if U2 -4 : 4.4V U2 -5 : 5V
No
Yes
Check if R55, R56, C35, Q4, D15
Check if U1 -2 is High (4.5V)
No
Yes
Check if U1 normal
Check soldering state of R57, D17

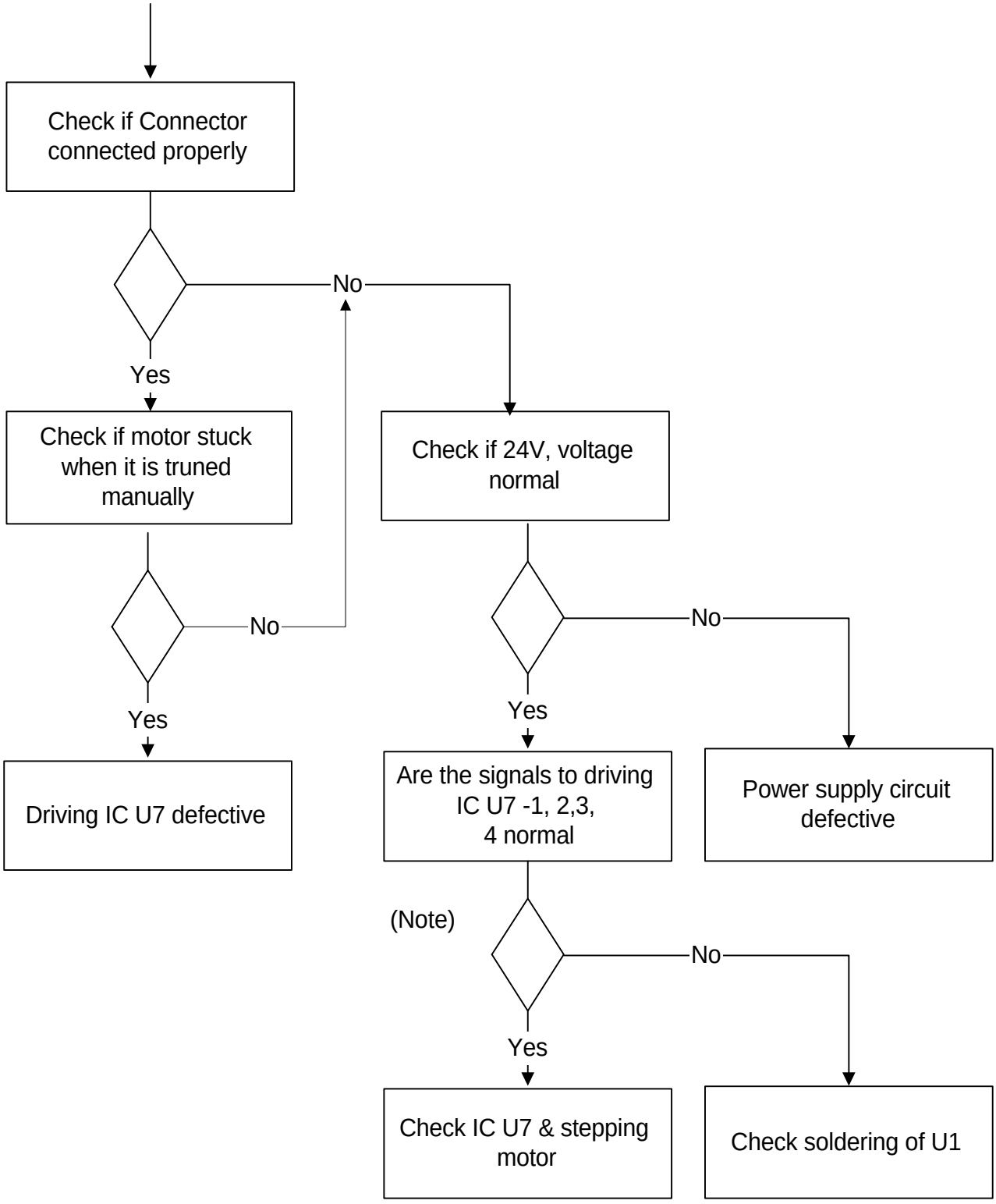
5.7 LCD DISPLAY “ NO PAPER ” WHILE RECORDING PAPER IS LOADED



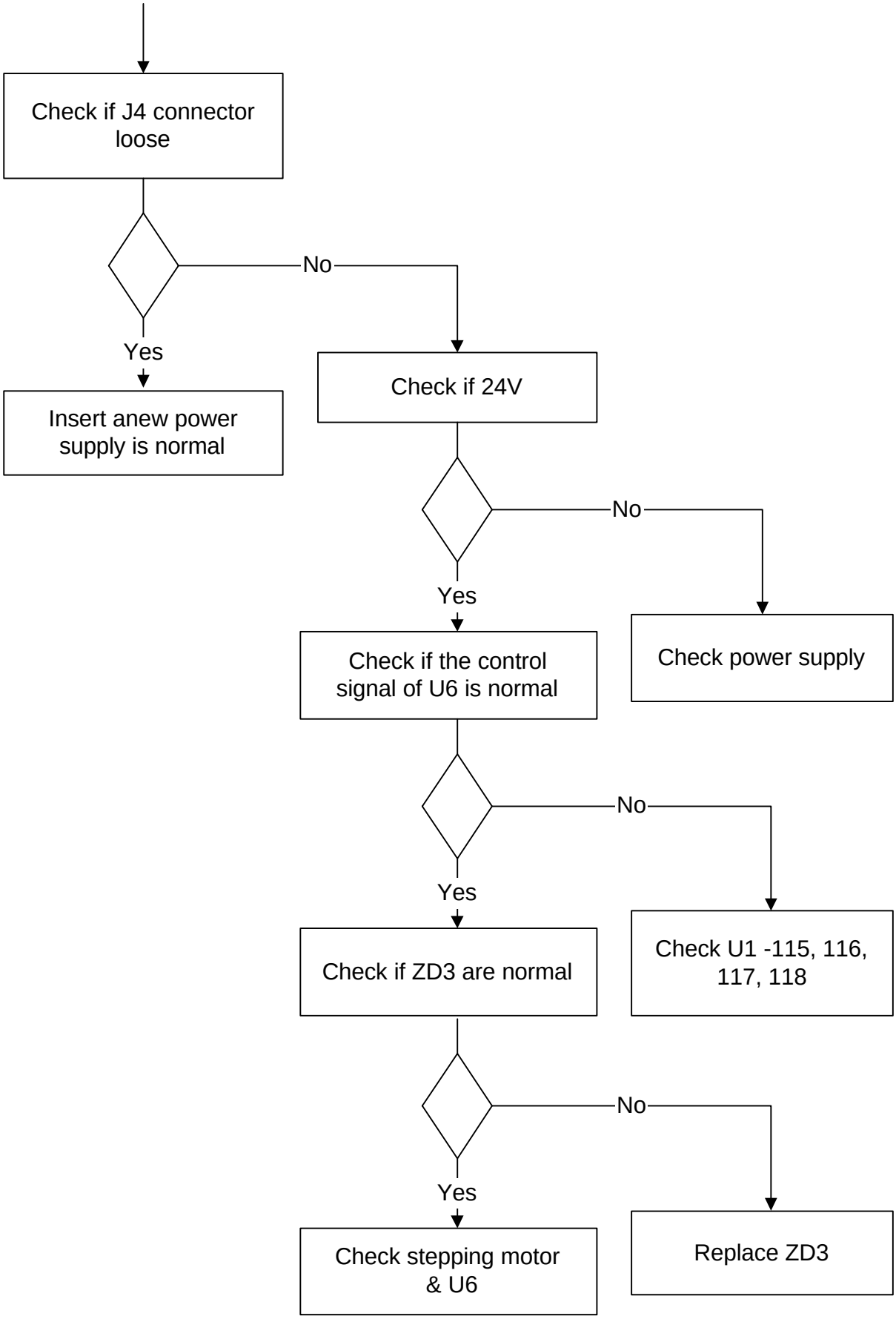
5.8. FAILED TO DETECT PAPER JAM SENSOR



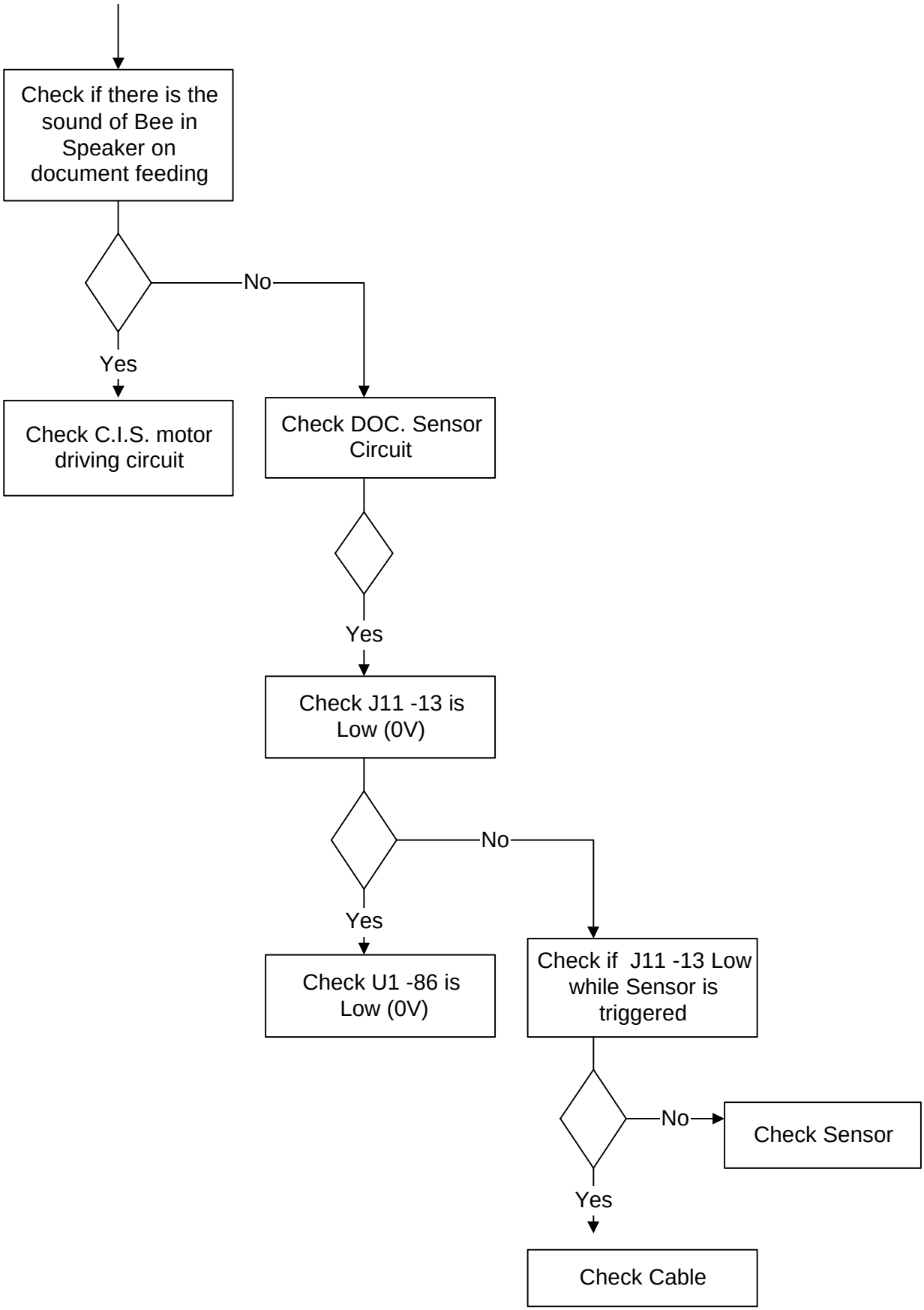
5.9 C.I.S. MOTOR REMAINS MOTIONLESS



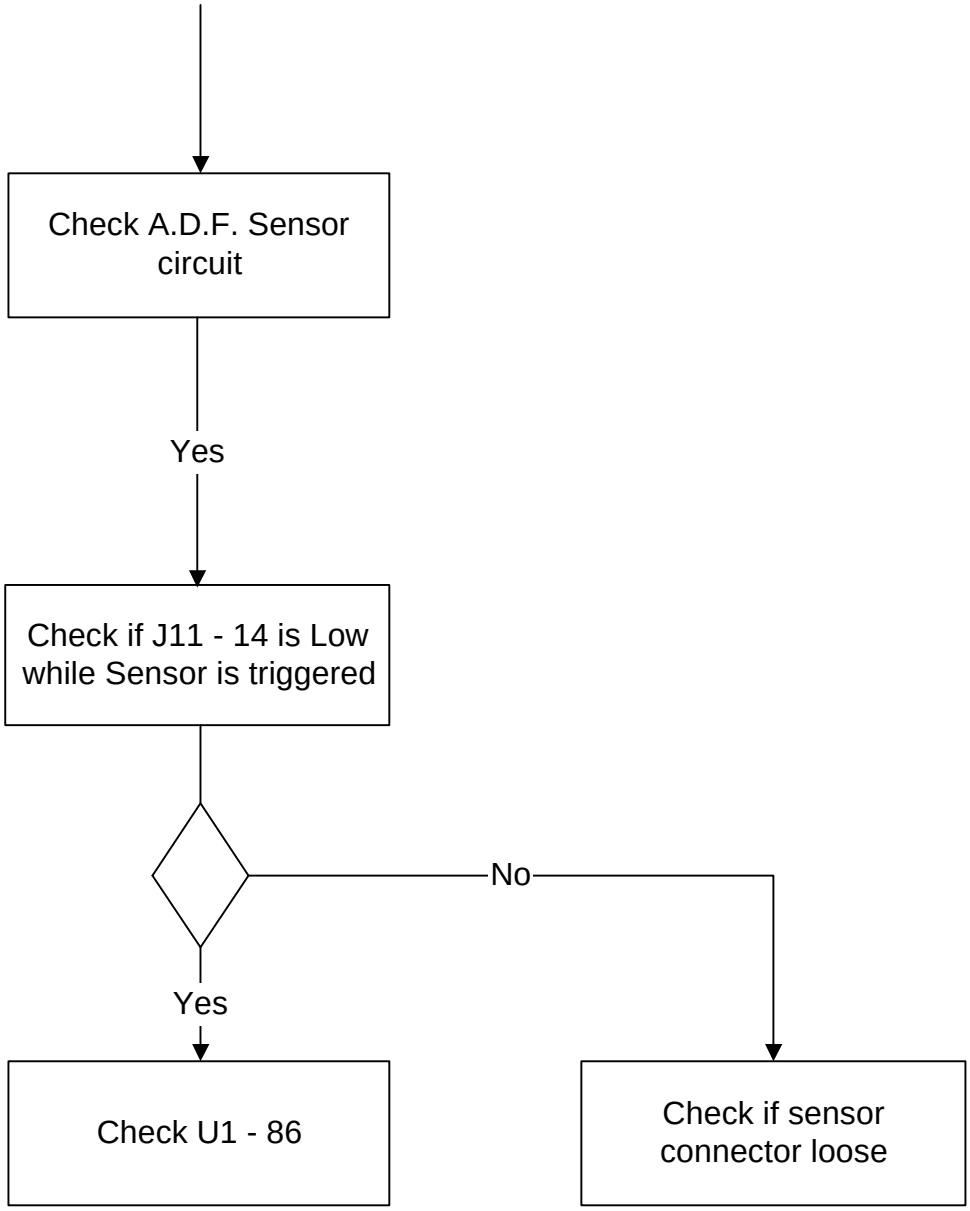
5.10.T.P.H. MOTOR REMAINS MOTIONLESS



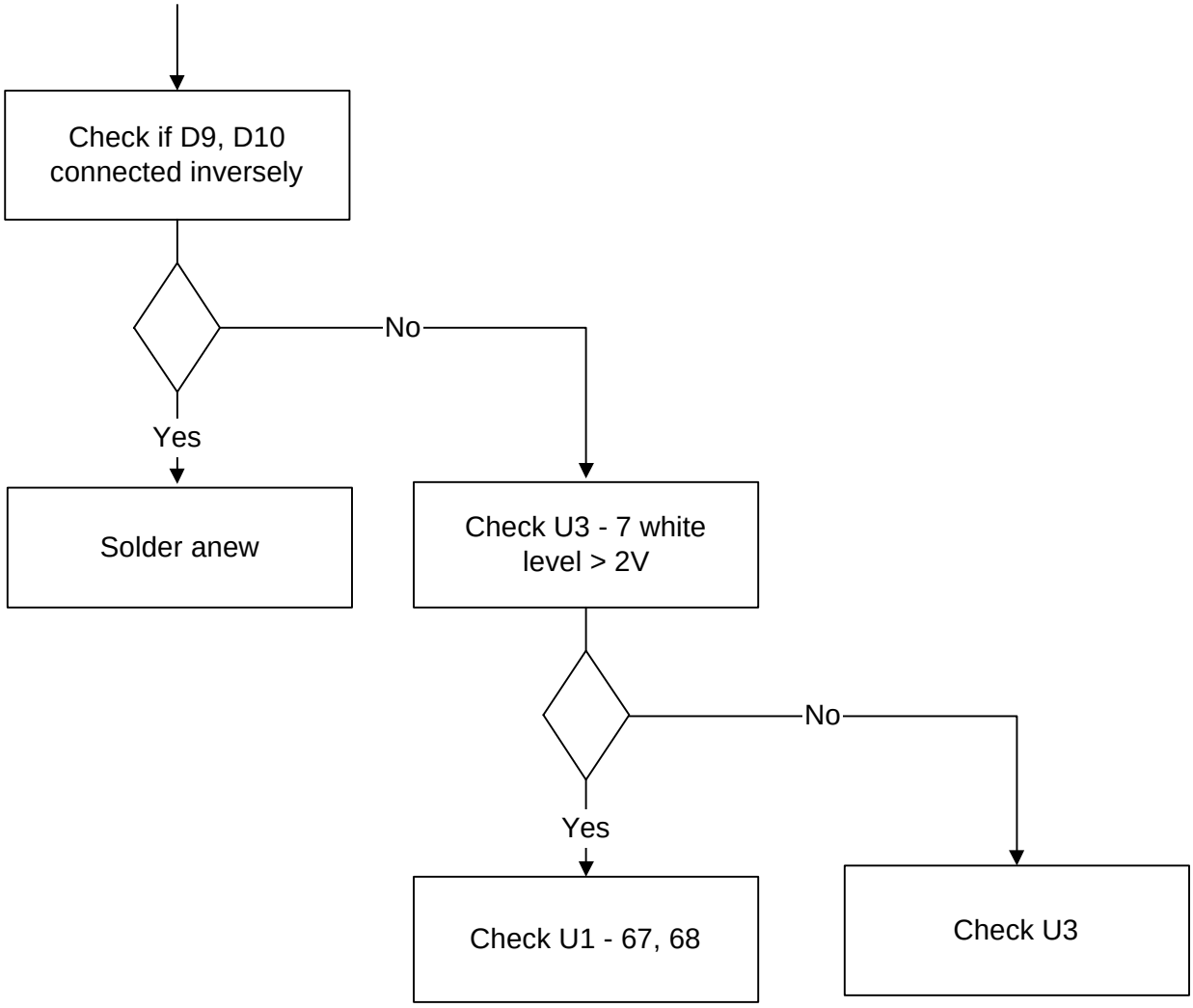
5.11.FAILED TO FEED DOCUMENT


Check if there is the sound of Bee in Speaker on document feeding
No
Yes
Check C.I.S. motor driving circuit
Check DOC. Sensor Circuit
Yes
Check J11 -13 is Low (0V)
No
Yes
Check U1 -86 is Low (0V)
Check if J11 -13 Low while Sensor is triggered
No
Check Sensor
Yes
Check Cable

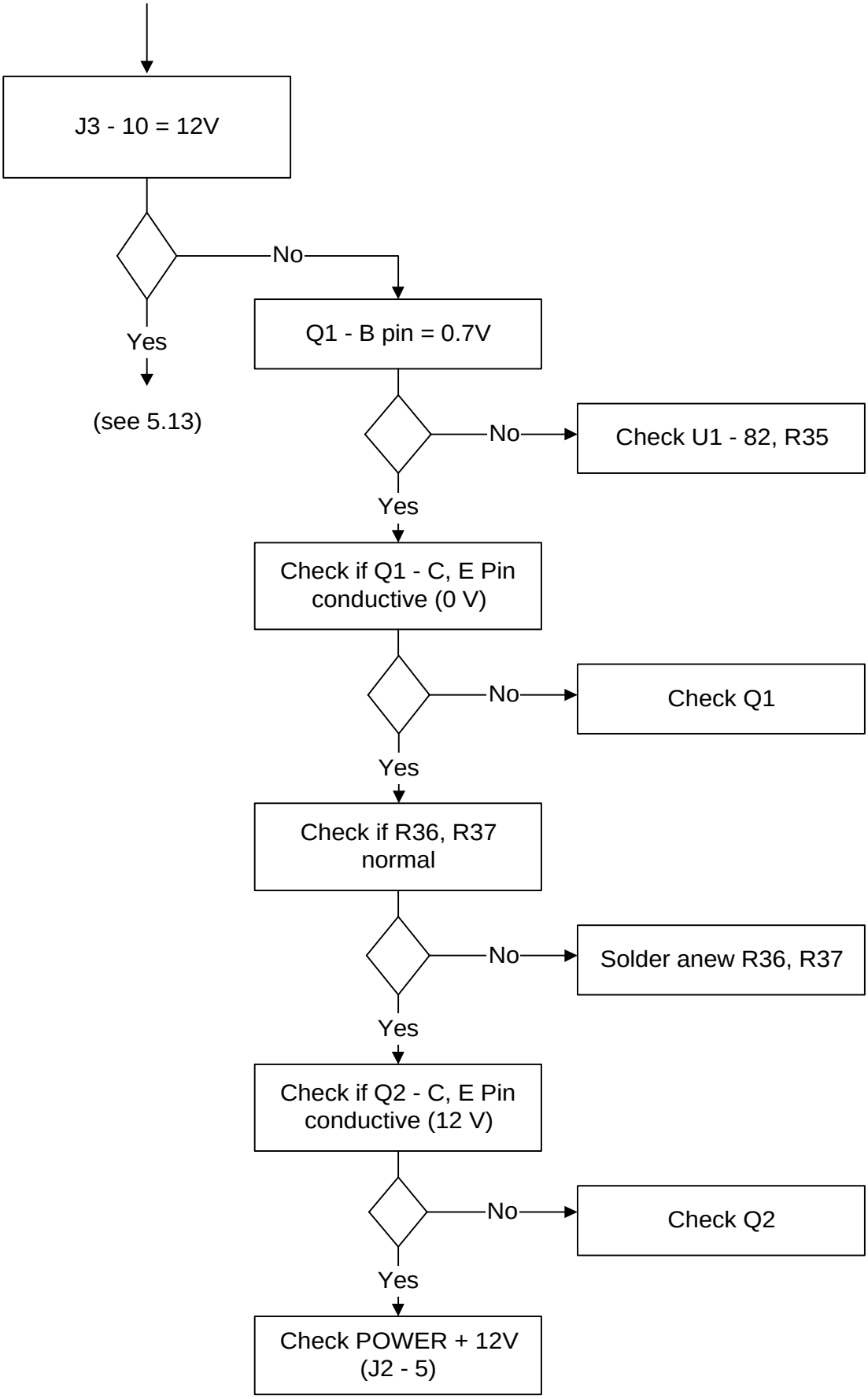
5.12.OVER FEEDING DOCUMENT UNTIL “ DOC. JAM ”



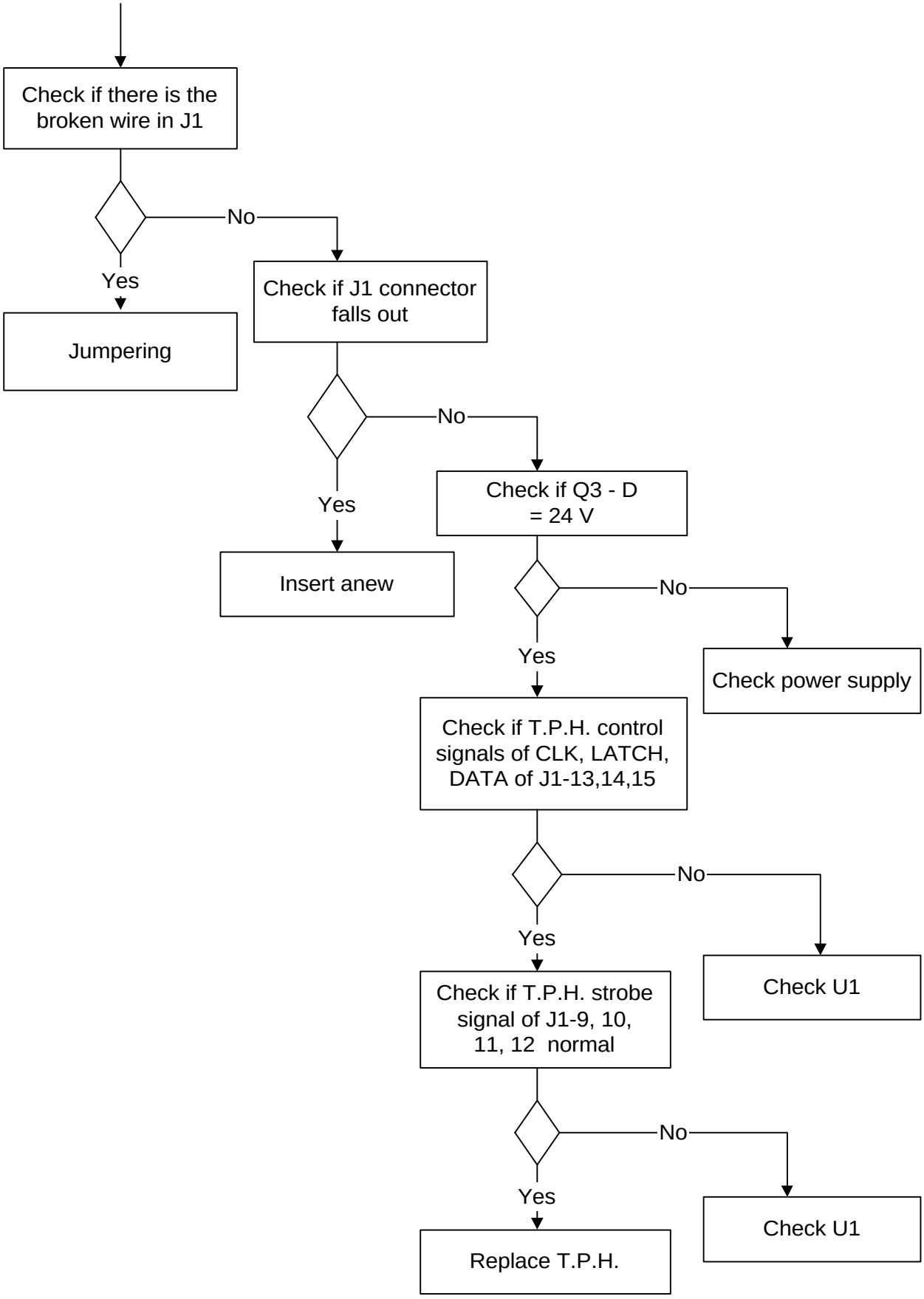
5.13. TOO LIGHT OR TOO THICK



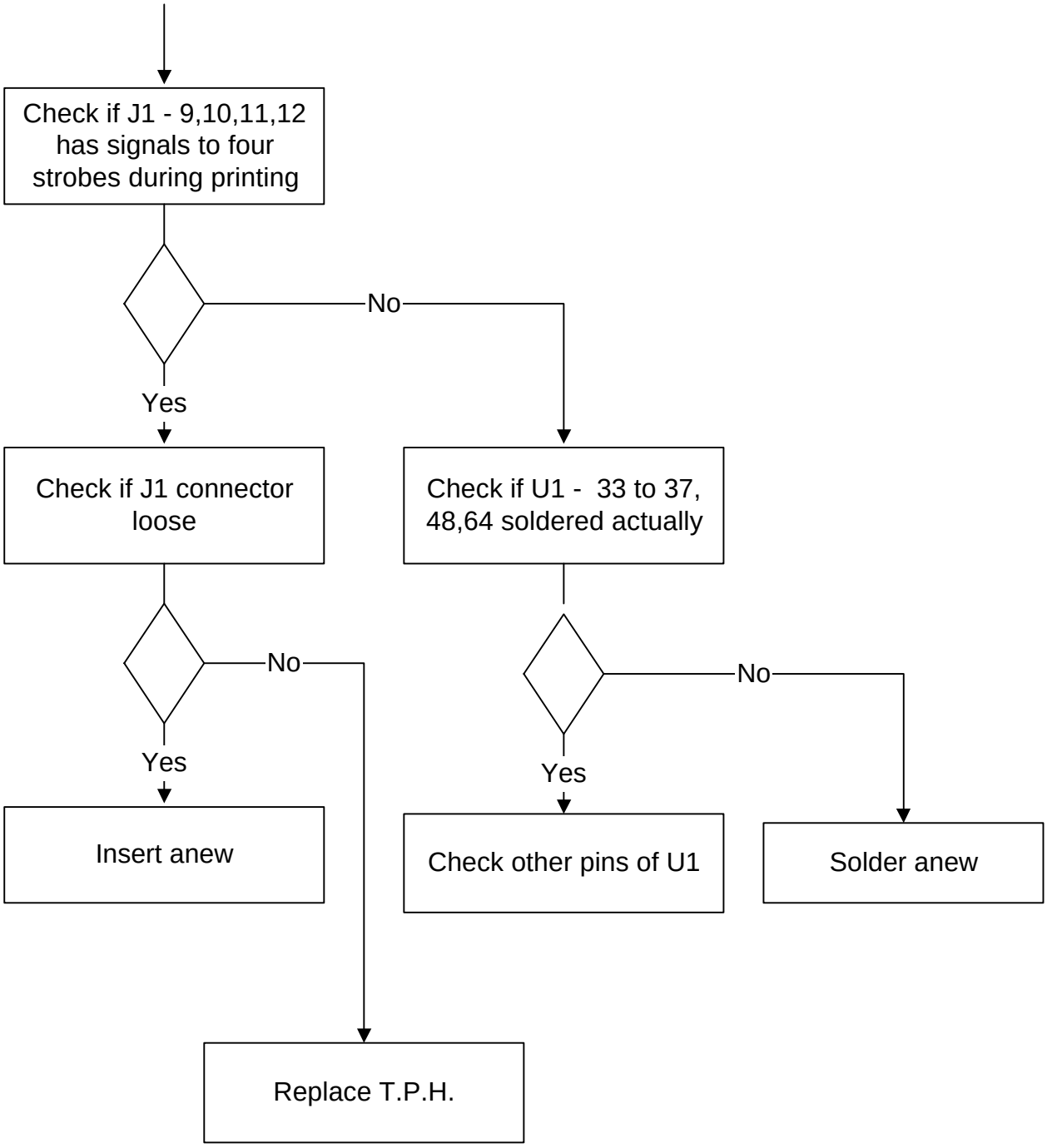
5.14. COPY FULL BLACK



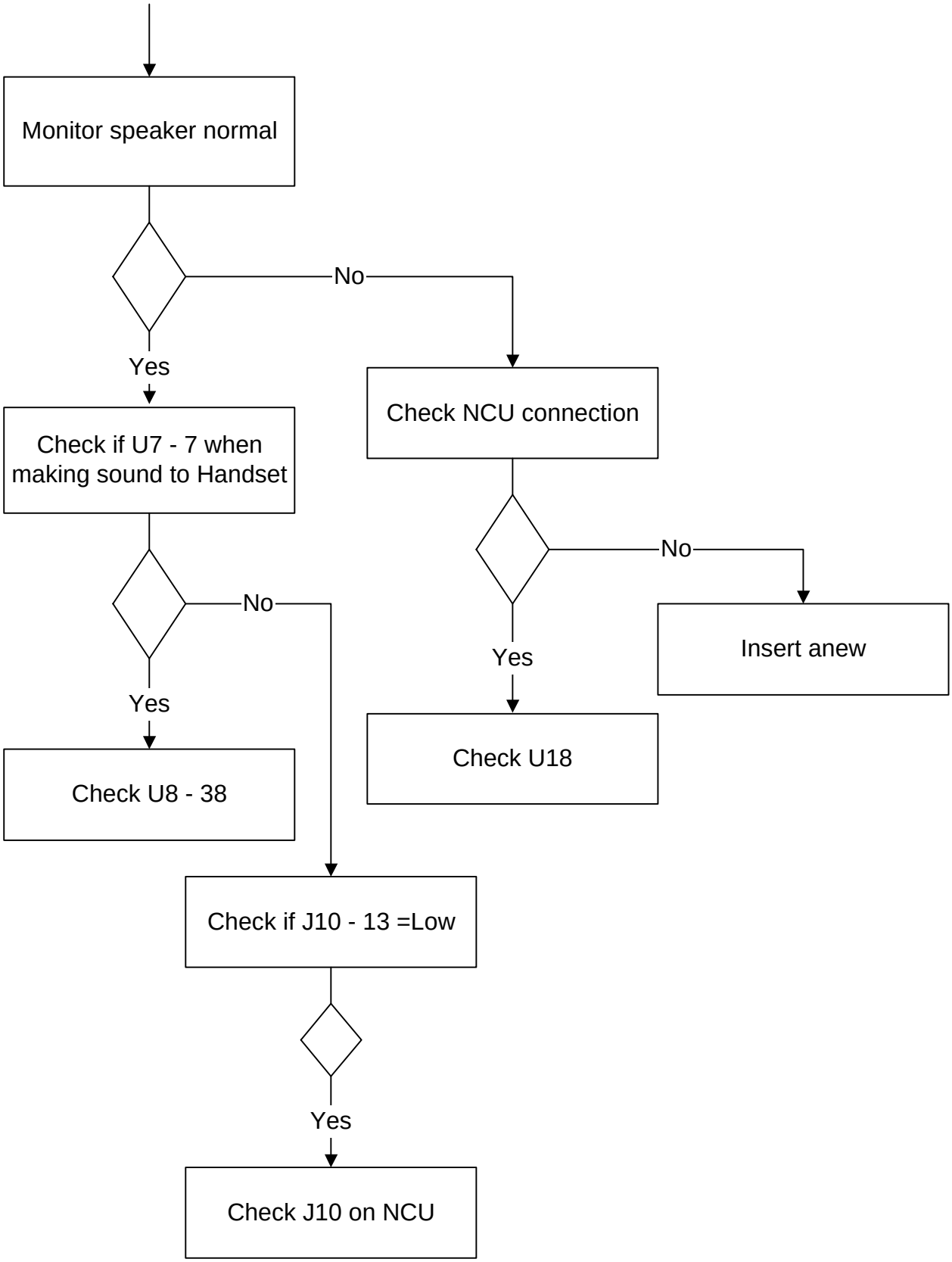
5.15.PULL WHITE PRINTING



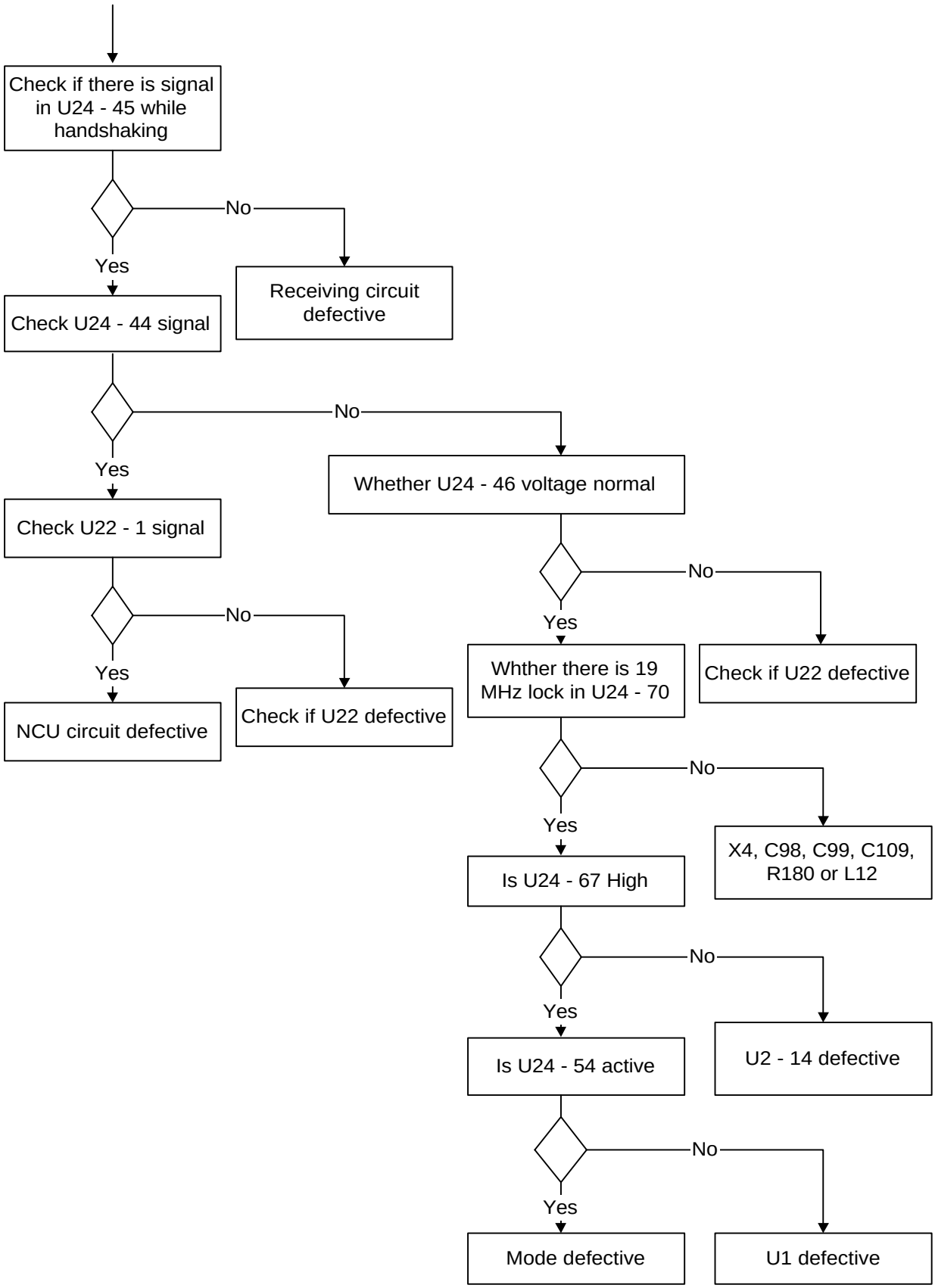
5.16.CERTAIN BLOCKS FAILED IN PRINTING


Check if J1 - 9,10,11,12 has signals to four strobes during printing
No
Yes
Check if J1 connector loose
Check if U1 - 33 to 37, 48,64 soldered actually
No
Yes
No
Yes
Insert anew
Check other pins of U1
Solder anew
Replace T.P.H.

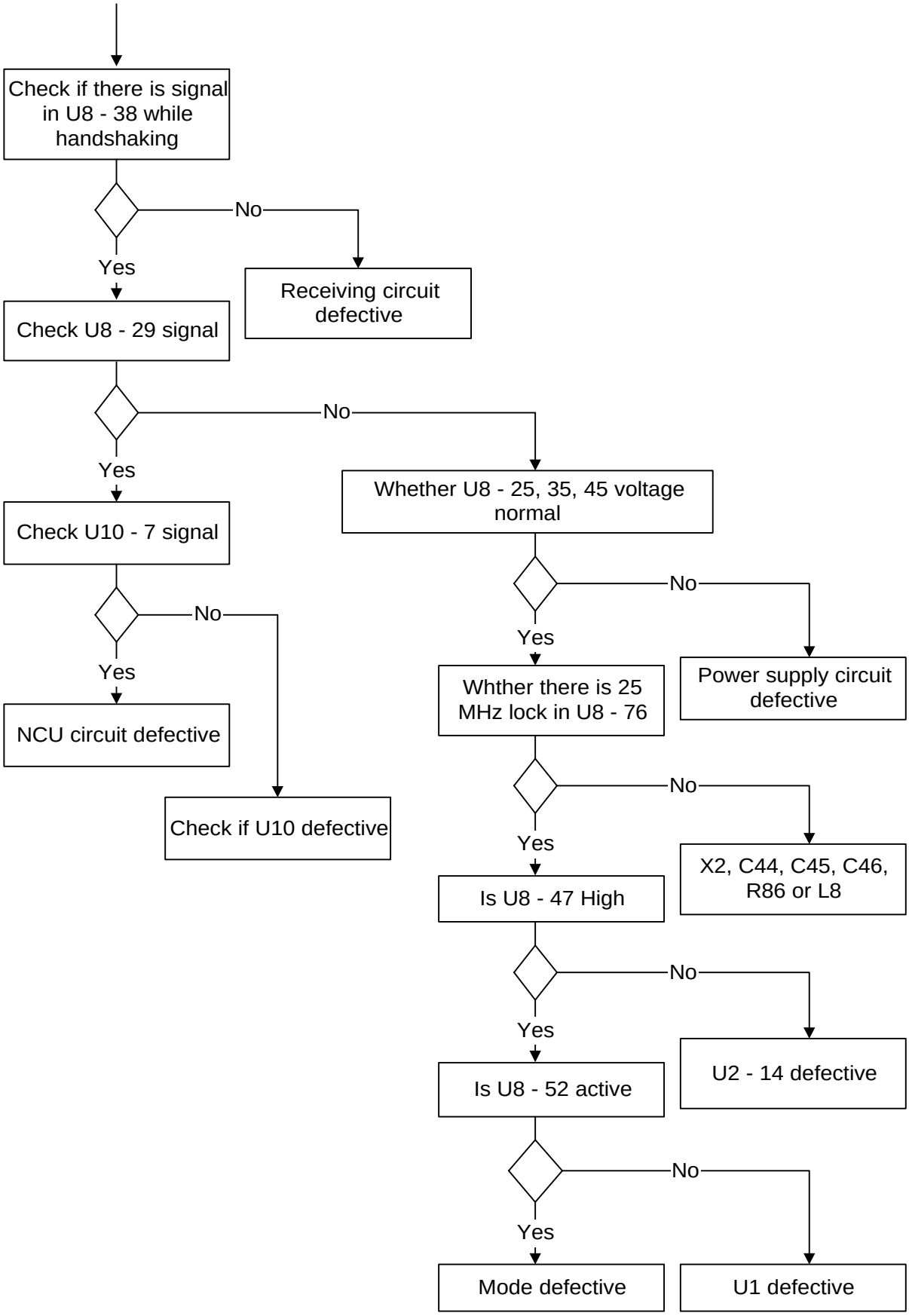
5.17. FAILED TO RECORD A MESSAGE (660 only)



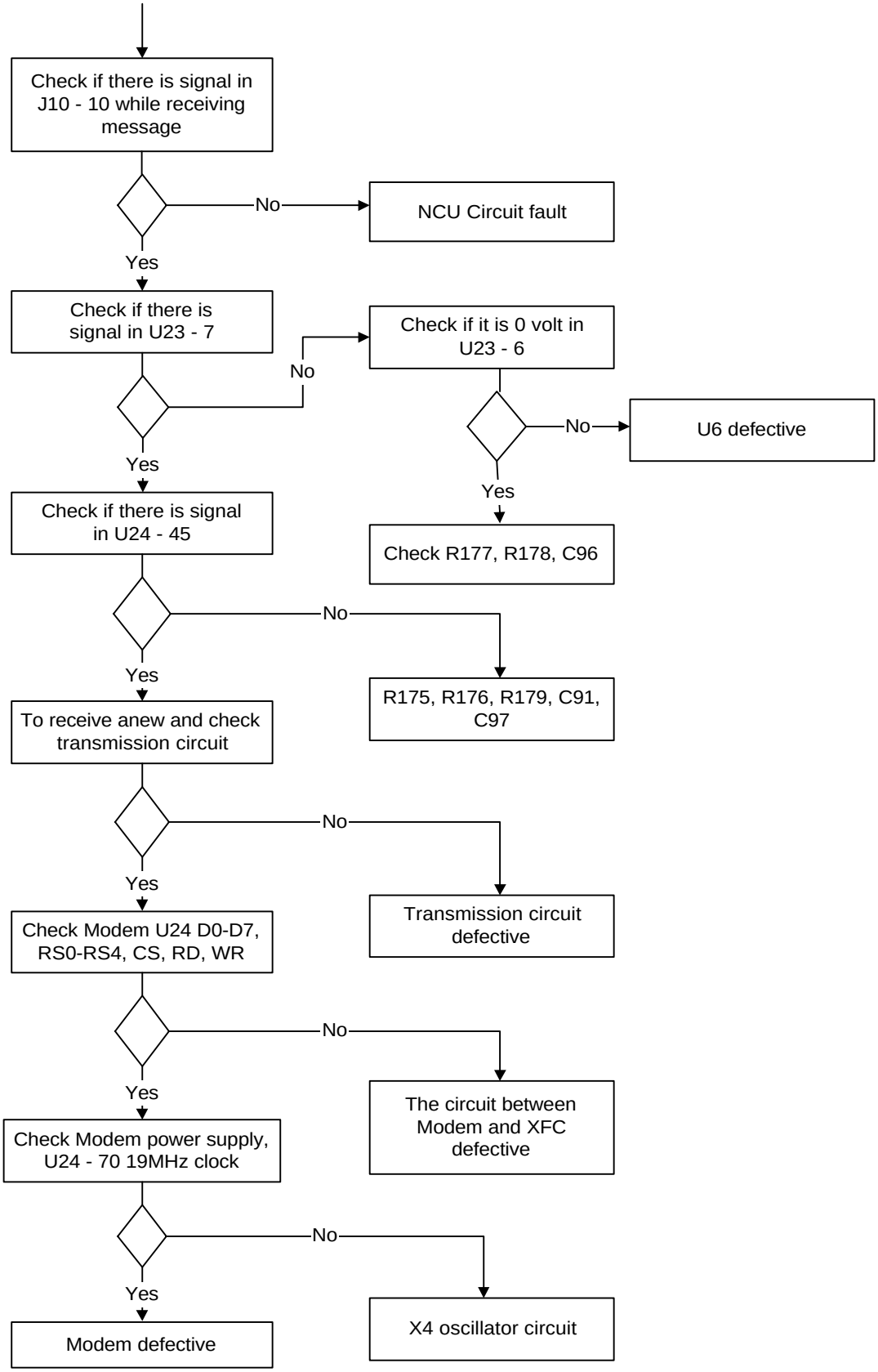
5.18.1.FAILED TO TRANSMIT SUCCESSFULLY (610 only)



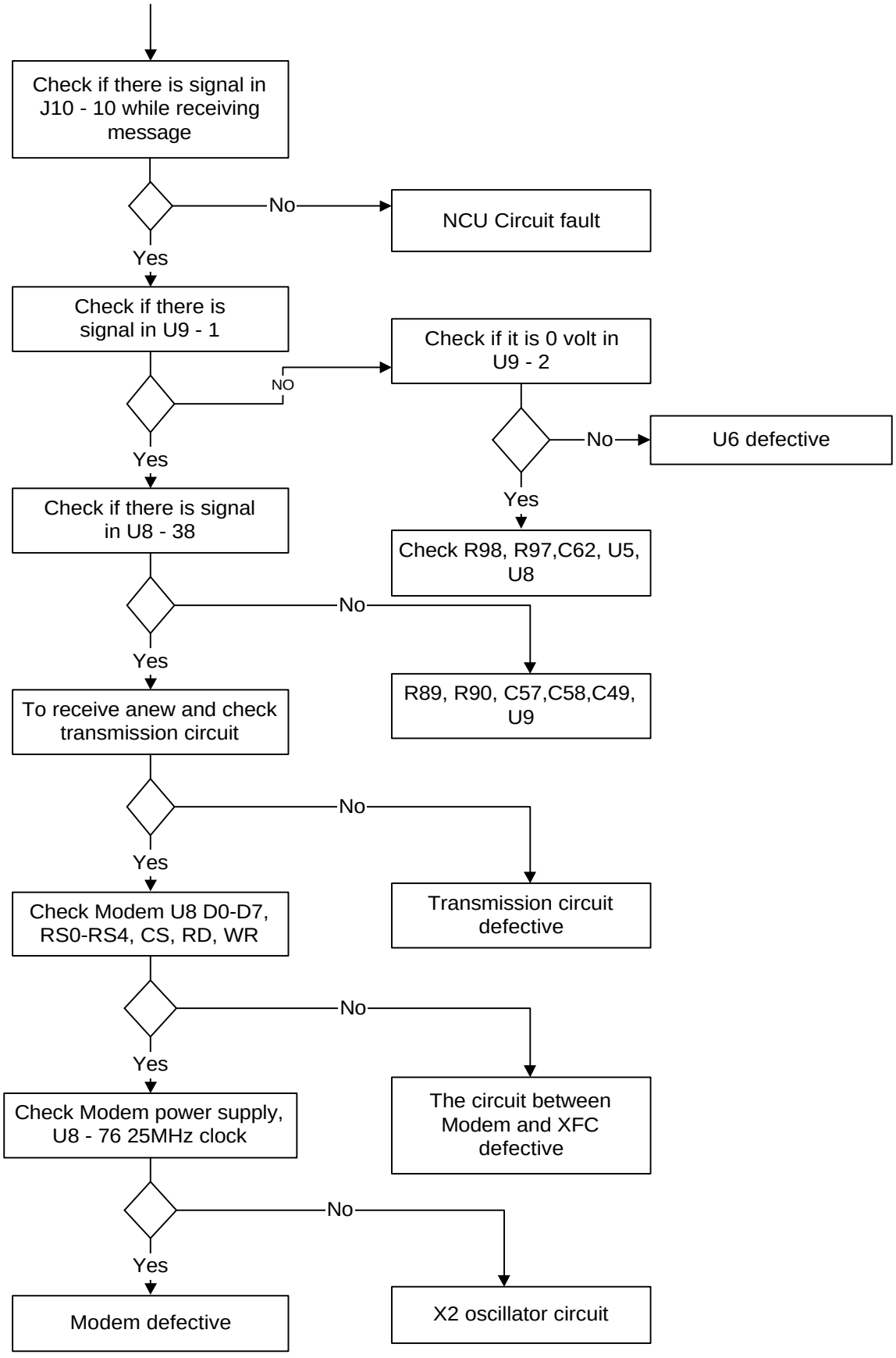
5.18.2.FAILED TO TRANSMIT SUCCESSFULLY (660 only)



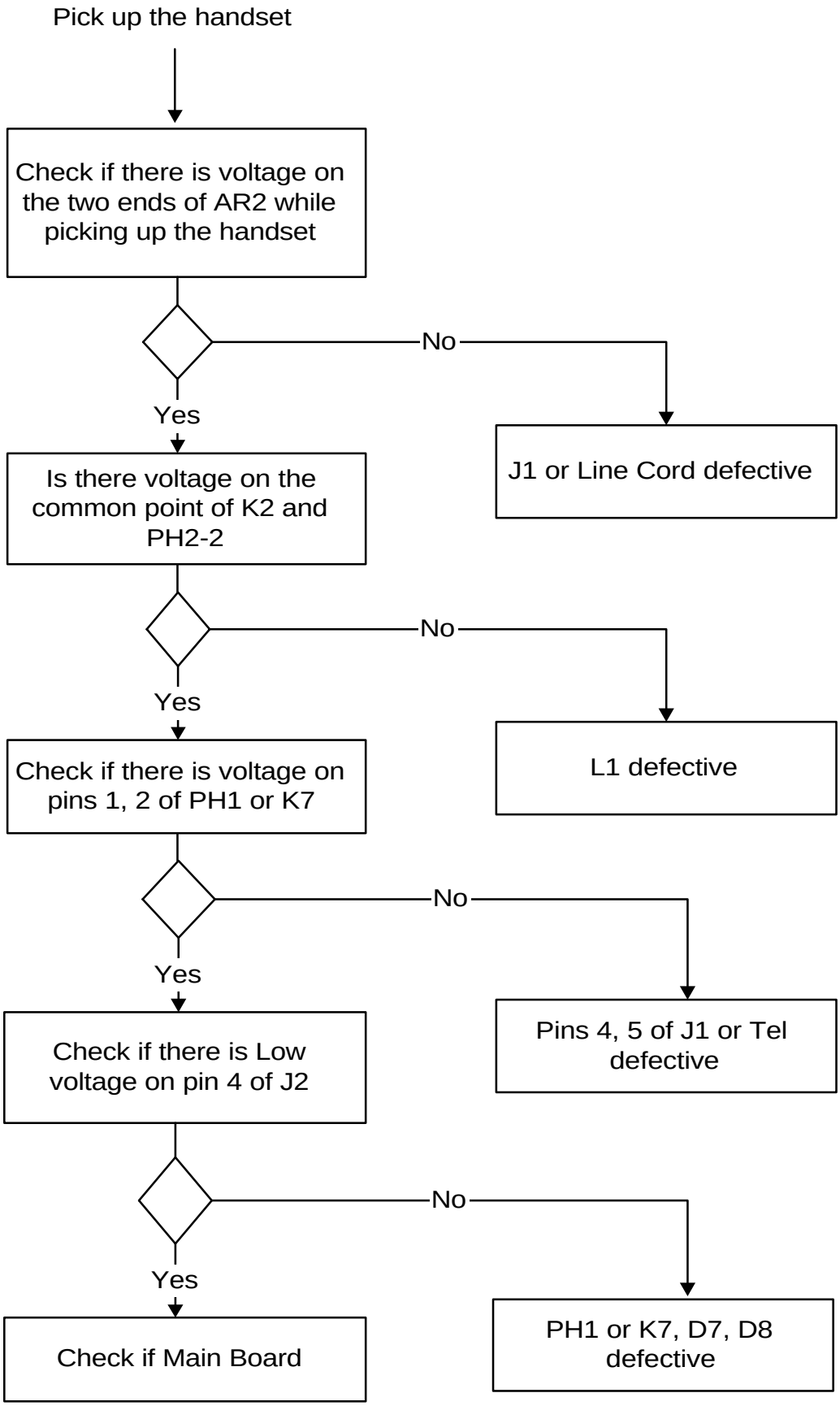
5.19.1.FAILED TO RECEIVE SUCCESSFULLY (610 only)



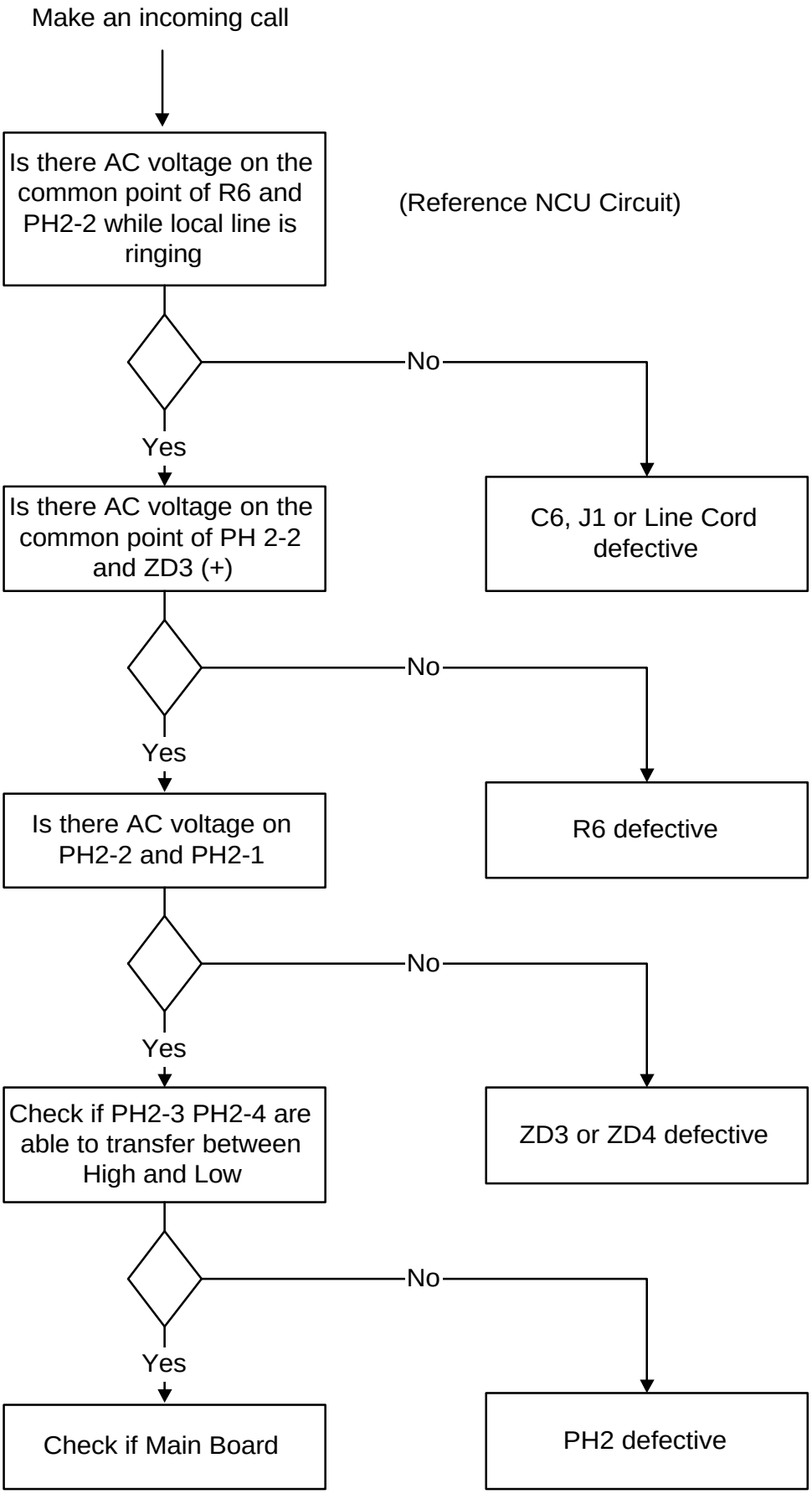
5.19.2 FAILED TO RECEIVE SUCCESSFULLY (OKI 660 only)



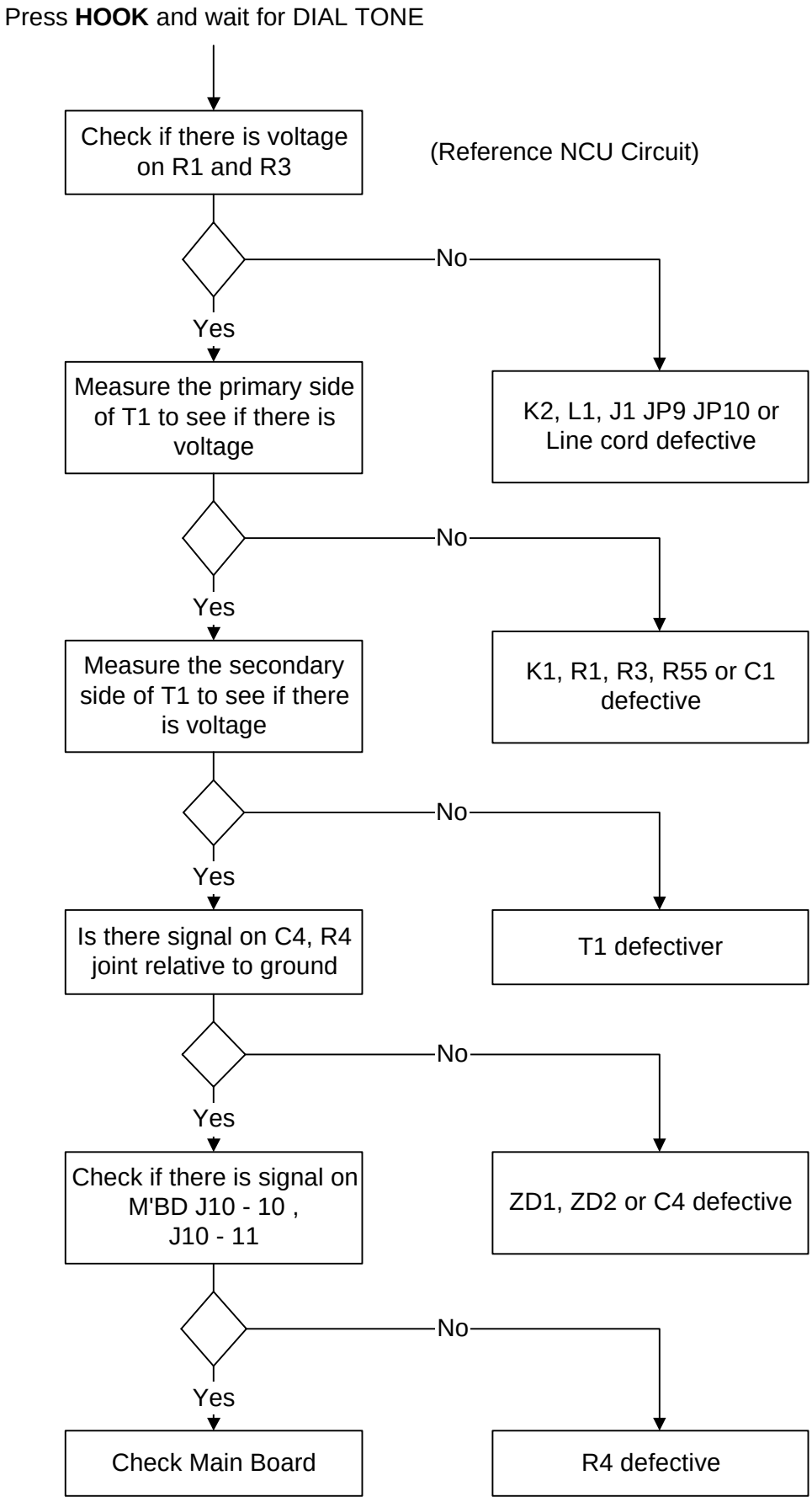
5.20. FAILED TO DETECT HANDSET


Pick up the handset
Check if there is voltage on the two ends of AR2 while picking up the handset
No
J1 or Line Cord defective
Yes
Is there voltage on the common point of K2 and PH2-2
No
L1 defective
Yes
Check if there is voltage on pins 1, 2 of PH1 or K7
No
Pins 4, 5 of J1 or Tel defective
Yes
Check if there is Low voltage on pin 4 of J2
No
PH1 or K7, D7, D8 defective
Yes
Check if Main Board

5.21. FAILED TO RECEIVE AUTOMATICALLY; IT KEEPS RINGING


Make an incoming call
Is there AC voltage on the common point of R6 and PH2-2 while local line is ringing
(Reference NCU Circuit)
No
Yes
C6, J1 or Line Cord defective
Is there AC voltage on the common point of PH 2-2 and ZD3 (+)
No
Yes
R6 defective
Is there AC voltage on PH2-2 and PH2-1
No
Yes
ZD3 or ZD4 defective
Check if PH2-3 PH2-4 are able to transfer between High and Low
No
Yes
PH2 defective
Check if Main Board

5.22.FAILED TO RECEIVE MANUALLY


Press **HOOK** and wait for DIAL TONE
Check if there is voltage on R1 and R3
(Reference NCU Circuit)
No
Yes
K2, L1, J1 JP9 JP10 or Line cord defective
Measure the primary side of T1 to see if there is voltage
No
Yes
K1, R1, R3, R55 or C1 defective
Measure the secondary side of T1 to see if there is voltage
No
Yes
T1 defectiver
Is there signal on C4, R4 joint relative to ground
No
Yes
ZD1, ZD2 or C4 defective
Check if there is signal on M'BD J10 - 10 , J10 - 11
No
Yes
R4 defective
Check Main Board

OKIFAX610/660

MECHANICAL TROUBLE SHOOTING

PROBLEM	CAUSE	ACTION
1. DOC. SKEWED	1. DOCUMENT LOADING OUT OF GUIDES.	1. ADVISE THE OPERATOR TO LOAD DOCUMENT WITHIN DOCUMENT GUIDES.
	2. UNEVEN I.S PRESSURE FORCE.	2. RE-ADJUST I.S. HINGE OR HEIGHT OF I.S. HINGE.
	3. DOC. TOO THIN OR TOO CURL.	3. USE CARRIER SHEET OR FIRST DUPLICATE FROM COPY MACHINE.
	4. DOC. IS JAMED ON THE WAY OF FEEDING PATH.	4. DEBURRING THE JAMED POINT.
	5. GROUNDING CABLE OR DOC. SENSOR CABLE IS STAYED ON KEY BOARD.	5. RE-ARRANGE THE CABLES OUT OF KEY BOARD AREA.
2. IMAGE ELONGATION.	1. ADF ROLLER IS LOCKED.	1. REPLACE CLUTCH SPRING.
	2. I.S. PRESSURE IS NOT ENOUGH OR NON-UNIFORM.	2. ADJUST I.S. HINGE OR REPLACE NEW ONE.
	3. I.S. PLATEN IS STAINED.	3. CLEAN I.S. PLATEN.
3. DOCUMENT DOUBLE FEEDING.	1. DOCUMENT TOO THICK OR TOO THIN, MIXED DOCUMENT.	1. LOAD CORRECT DOCUMENT.
	2. SEPARATION RUBBER SHEET IS ABRADED.	2. REPALCE NEW SEPARATION RUBBER SHEET.
	3. CLAMPING PLATE IS FATIGUE.	3. CHANGE NEW ONE.
4. DOCUMENT JAM	1. A.D.F SENSOR FALLEN OR FAILURE.	1. SNAP-IN FIT A.D.F SENSOR AGAIN OR REPLACE NEW ONE.
	2. STAINED A.D.F. ROLLER	2. CLEAN OR REPLACE A.D.F. ROLLER
5. HIGH BACKGROUND OR ALL BLACK	1. INCONTRAST.	1. INITIAL AGAIN.
	2. STAINED I.S. GLASS.	2. CLEAN I.S. GLASS.
	3. I.S. CONNECTOR LOOSEN.	3. PLUG IN I.S. CONNECTOR.

6. DOC. NO FEEDING	1. DEFECTIVE DOCUMENT SENSOR.	1. REPLACE DOC. SENSOR
	2. A.D.F ROLLER IS LOCKED.	2. REPLACE A.D.F. CLUTCH SPRING.
	3. DEFECTIVE I.S. MOTOR	3. REPLACE I.S. MOTOR.

PROBLEM	CAUSE	ACTION
7. PAPER JAM OR SKEW.	1. A.P.F. SENSOR FALLEN.	1. SNAP-IN FIT THE A.P.F. SENSOR IN IT'S POSITION.
	2. A.P.F. CLUTCH SPRING UNLOCKED.	2. REPLACE A.P.F. CLUTCH SPRING.
	3. LOWER GUIDE TOO NARROW.	3. REPLACE NEW LOWER GUIDE.
	4. DEFECTIVE A.P.F.SENSOR.	4. REPLACE A.P.F. SENSOR.
	5. BURRING EXISTED ON THE PAPER PATH.	5. DEBURRING A.P.F. SENSOR'S PLACE OF FRAME.
8. PAPER NO FEEDING	1. PAPER SENSOR IS FALLEN OR FAILURE.	1. RELOCATE OR REPLACE NEW PAPER SENSOR
	2. A.P.F. CLAMPING PLATE IS FATIIGUE OR LOOSEN.	2. REPLACE NEW A.P.F. CLAMPING PLATE OR RELOCATE IT IN POSITION.
	3. PRE-FEED ROLLER FALLEN.	3. RELOCATE THE PRE-FEED ROLLER.
9. IMAGE SERIOUS SHORTAGE OR HORIZONTAL BLACK LINE GENERATED.	1. PAPER JAM.	1. REMOVE JAM PAPER AND ADJUST RIBBON.
	2. T.P.H. PRESSURE TOO STRONG.	2. REPLACE T.P.H. COIL SPRING.
	3. PULLED SIDE RIBBON TOO TIGHT.	3. REPLACE RIBBON TENSION SPRING OR FRICTION PAD.
10. DEFECTIVE IMAGE-VERTICLE BLACK LINES OR BARS	1. STAINED I.S. GLASS.	1. CLEAN I.S. GLASS.
	2. DEFECTIVE I.S..	2. REPLACE I.S. ASM.
11. DEFECTIVE IMAGE-VERTICLE WHITE LINES OR BARS	1. STAINED T.P.H SUBSTRATE.	1. CLEAN T.P.H. SUBSTRATE.
	2. DEFECTIVE T.P.H..	2. REPLACE T.P.H. ASM.
	3. T.P.H. CONNECTOR IS LOOSEN.	3. PLUG IN THE T.P.H. CONNECTOR DEFINITELY.
12. PRINT DENSITY NON-UNIFORM	1. STAINED I.S. GLASS OR I.S. PLATEN.	1. CLEAN GLASS SURFACE OR I.S. PLATEN.
	2. INSUFFICIENT T.P.H. PRESSURE FORCE.	2. REPLACE T.P.H COIL SPRING IN VERTICLE.
	3. T.P.H. HINGE SKEW.	3. FIX THE RIGHT OR LEFT HINGE IN SQUARE WITH T.P.H..
	4. T.P.H. DEFECTED.	4. CHANGE T.P.H. ASM.

PROBLEM	CAUSE	ACTION
13. PAPER MULTI-FEED	1. A.P.F. COIL SPRING IS LOST OR FATIGUE.	1. REPLACE THE A.P.F. COIL SPRING.
	2. A.P.F. SEPARATION RUBBER SHEET IS ABRADED.	2. REPLACE NEW ONE.
14. THE CENTRAL AREA OF DOCUMENT IS WRINKLED AFTER SENDING.	1. A.D.F ROLLER IS DIFFICULT TO ROTATE OWING TO PULLING BACK DOC. WITHOUT OPENING THE OPERATION PANEL.	1. PULL A.D.F. ROLLER DOWNWARD FOR SEVERAL TIMES AND MAKE SURE IT IS UNLOCKED OR REPLACE THE NEW CLUTCH SPRING.
15. RIBBON COME OUT OF THE MACHINE	1. TAKE-UP RIBBON TOO LOOSE AND CAUSE JAM.	1. REPLACE THE NEW LEFT COG. (GEAR WHEEL.)
	2. FOREIGN PART IS FALLEN INTO THE FRONT COMPARTMENT.	2. CLEAR OFF THE FALLEN PARTS FROM COMPARTMENT.
16. RIBBON CREASE.	1. REAR TENSION BAR IS LOST.	1. REPLACE THE REAR TENSION BAR IN IT'S POSITION.
	2. RIBBON FRICTION PAD IS LOST.	2. REPLACE THE FRICTION PAD.
17. PRINT PAPER MERGE INTO TAKE-UP RIBBON.	1. PEEL-OFF TENSION BAR LOCKED OR LOST.	1. REPLACE THE PEEL OFF TENSION BAR IN IT'S POSITION.
	2. LEFT COG MISS FITTED.	2. RE-INSERT THE COG ALIGNED CORRECTLY INTO THE RIBBON ROLL.
18. COPY TOO LIGHT	1. INCONTRAST.	1. SYSTEM INITIAL AGAIN.
	2. I.S. DEFECTED.	2. CHANGE I.S. ASM.
19. "NO RIBBON" DISPLAYED WHEN RIBBON IS EXISTED	1. RIBBON SENSOR SKEWED IN POSITION.	1. RE-FIX THE RIBBON SENSOR TO REAR END.
	2. RIBBON SENSOR DEFECTED.	2. CHANGE NEW ONE.
20. SPEAKER SCUND IS LOW OR DISTORTED	1. SPONGE OF SPEAKER TOUCH THE SPEAKER CONE.	1. REPLACE BY THINNER SPONGE (1.2mm) AND RESEAT CORRECTLY.

CHAPTER 6
MECHANICAL DISASSEMBLY AND REASSEMBLY

This chapter explains the procedures for replacement of parts, assemblies and units in the field.

6.1 GENERAL

6.1.1 PRECAUTIONS PARTS REPLACEMENT

1. Before starting dismantlement and assembly, always pull out the AC plug.
2. Since screws, small parts are likely to be lost, they should temporarily be attached to their original positions.
3. Wen handling items such as circuit boards, do not wear gloves that are likely to generate static electricity.
4. Do not place printed circuit boards directly on the equipment or on the floor.

6.1.2 TOOLS

Table 6.1.2 shows the tools required for replacement of parts such as circuit boards and mechanical units.

Table 6.1.2 Tooling List

ITEM	SERVICE TOOLS	TYPE	Q'TY	REMARKS
1	PHILIPS SCREWSRIVER (L)	RUBICON 107	1	
2	PHILIPS SCREWSRIVER (M)	RUBICON 102	1	
3	PHILIPS SCREWSRIVER (S)	RUBICON 104	1	
4	STRAIGHT SCREWDRIVER	RUBICON 101	1	
5	RADIO PLIERS		1	
6	CUTTING PLIERS	4"	1	
7	MULTIMETER		1	SHORT-CIRCUIT TEST
8	DIGITAL STORAGE OSCILLOSCOPE 100 MHZ (UP)		1	

6.2 GENERAL MECHANICAL STRUCTURE

The general mechanical structure of the FAX machine is shown in Figure 6.2

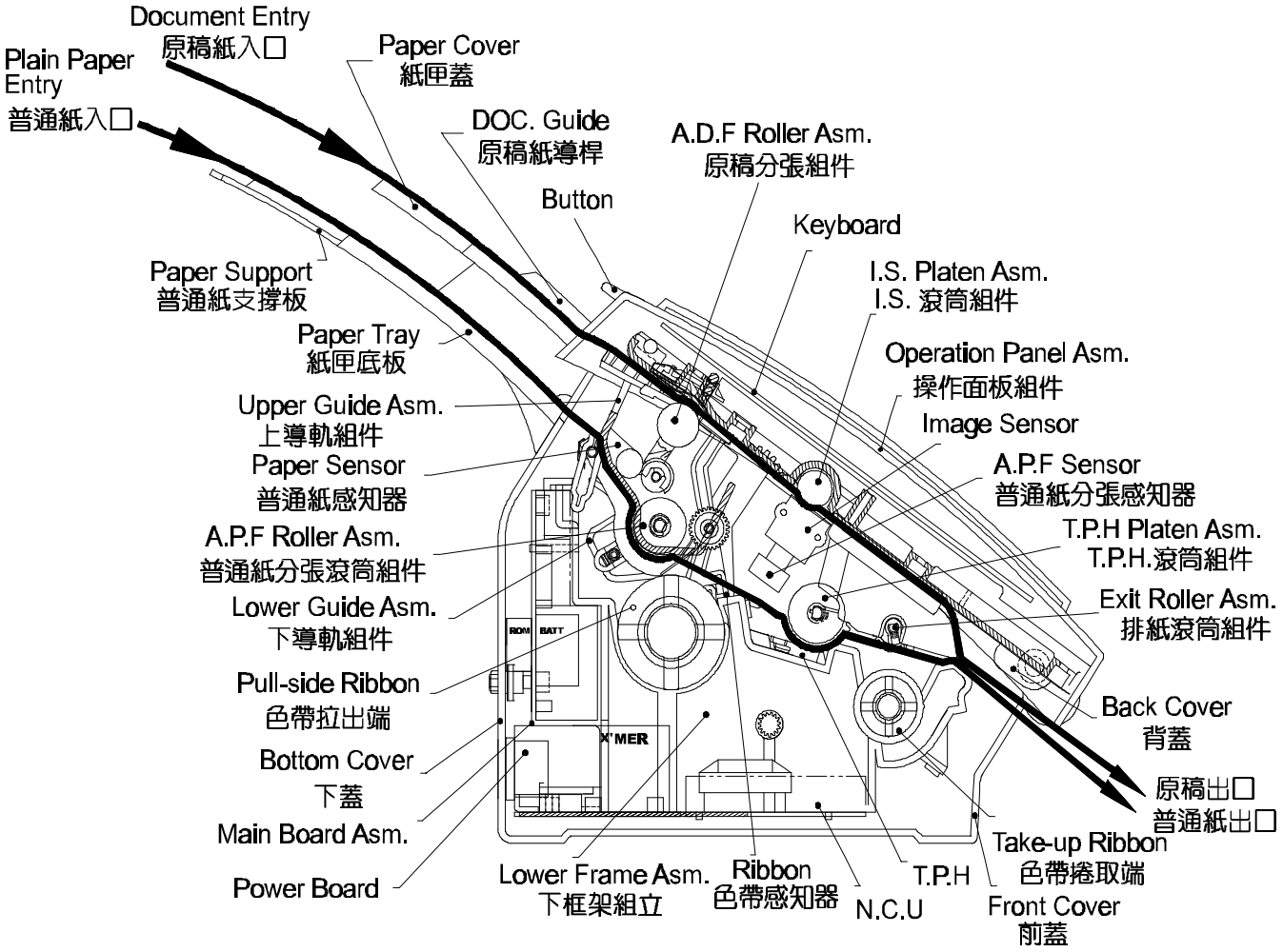


Figure 6.2

6.3 HOW TO DISASSEMBLE STRUCTURE

This item explains how to dismantle and assemble this FAX machine.
Figure 6.3 shows the procedure flow of dismantlement as the generalization.
The detailed procedure of dismantlement is explained from sub-item 6.3.1 to6.3…

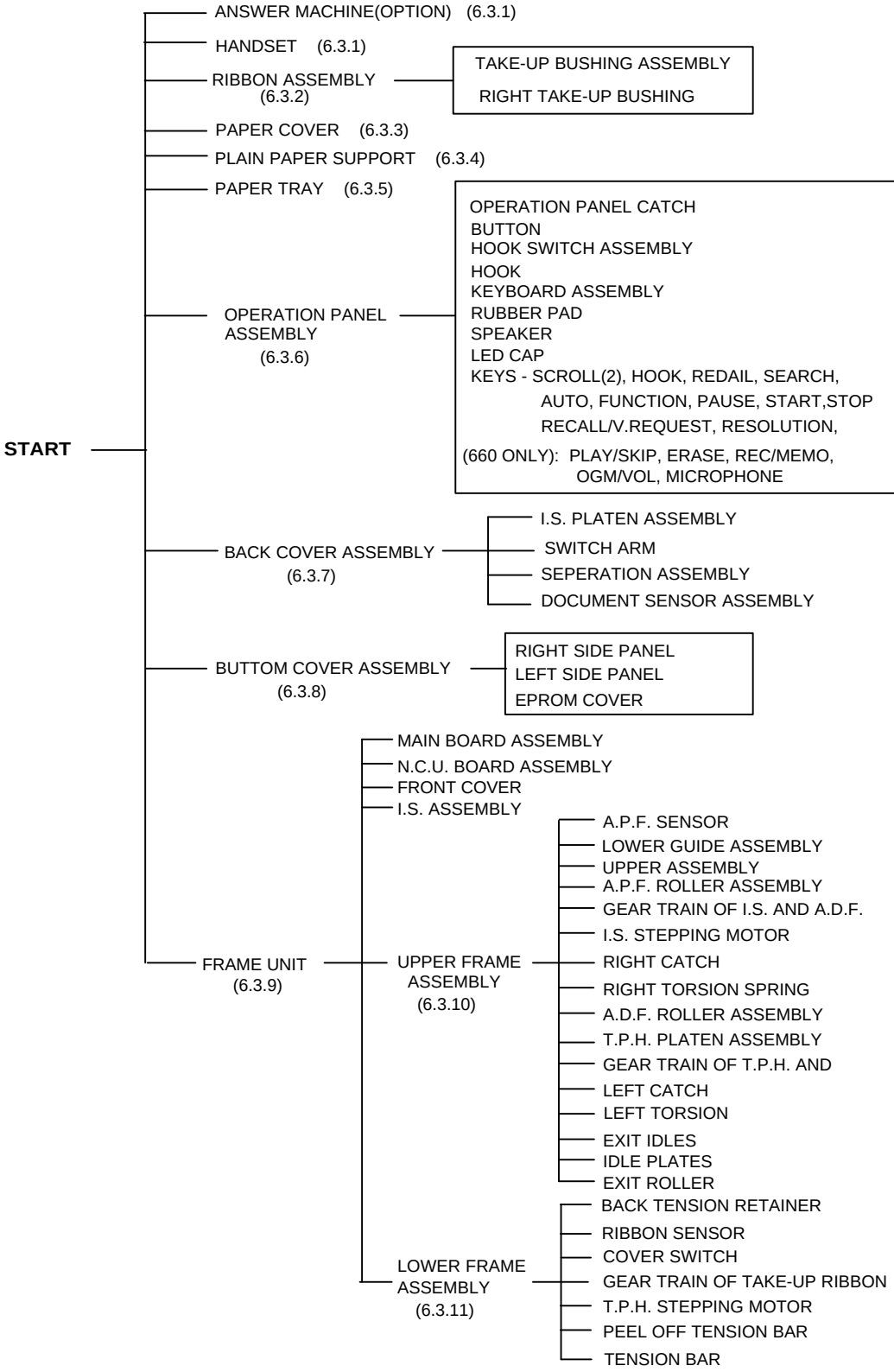


Figure 6.3

The steps of dismantlement, reversing the steps of assembly, are shown as follows. For the convenience of explanation, some definitions are stated as follows:

i The **Front** of machine means the face of operation panel.
ii The **Left** and **Right** mean the left and right hand side facing the front of machine.
iii The directions of **Clockwise** and **Counterclockwise** are defined viewing from the right of machine.

6.3.1 Handset and Answering Machine (Option)

Pull out the plug of handset and line cord, then take out handset.

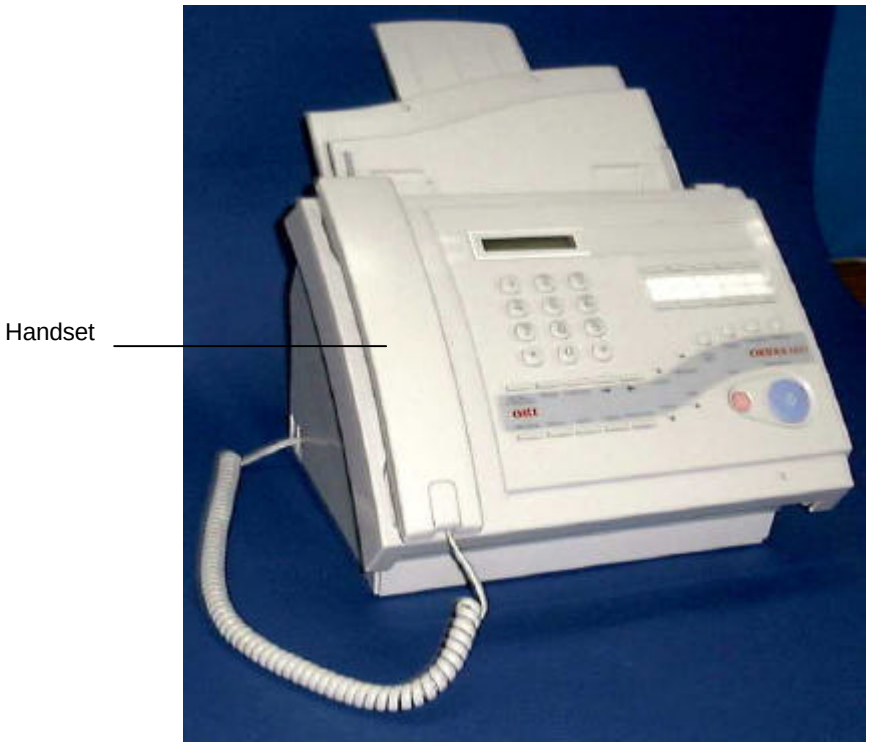


Figure 6.4

6.3.2 Operation Panel Assembly

(1) Loosen 6 pieces of M3.8 tapping screws on **Back Cover Assembly**.
(2) Pull out the connector of **Document Sensor Assembly** from **Keyboard Assembly**.
(3) Rotate **Back Cover Assembly** clockwise, pull out connectors on the corner of the **Operation Panel Assembly** and take out microphone. Remove **Back Cover Assembly** and **Operation Panel Assembly**.

(4) Upper Cover Assembly

i. Pull out the connector of speaker on the edge of keyboard, then the speaker can be taken out.
ii. Pull out connector of **Hook Switch Assembly** on the corner of keyboard. Loosen 2 pieces of M2.3.6 tapping screws and then take out **Hook Switch Assembly** and hook.
iii. Loosen 6 pieces of M3.8 tapping screws on **Upper Cover Assembly** and then take out **Operation Panel Sub Assembly**.

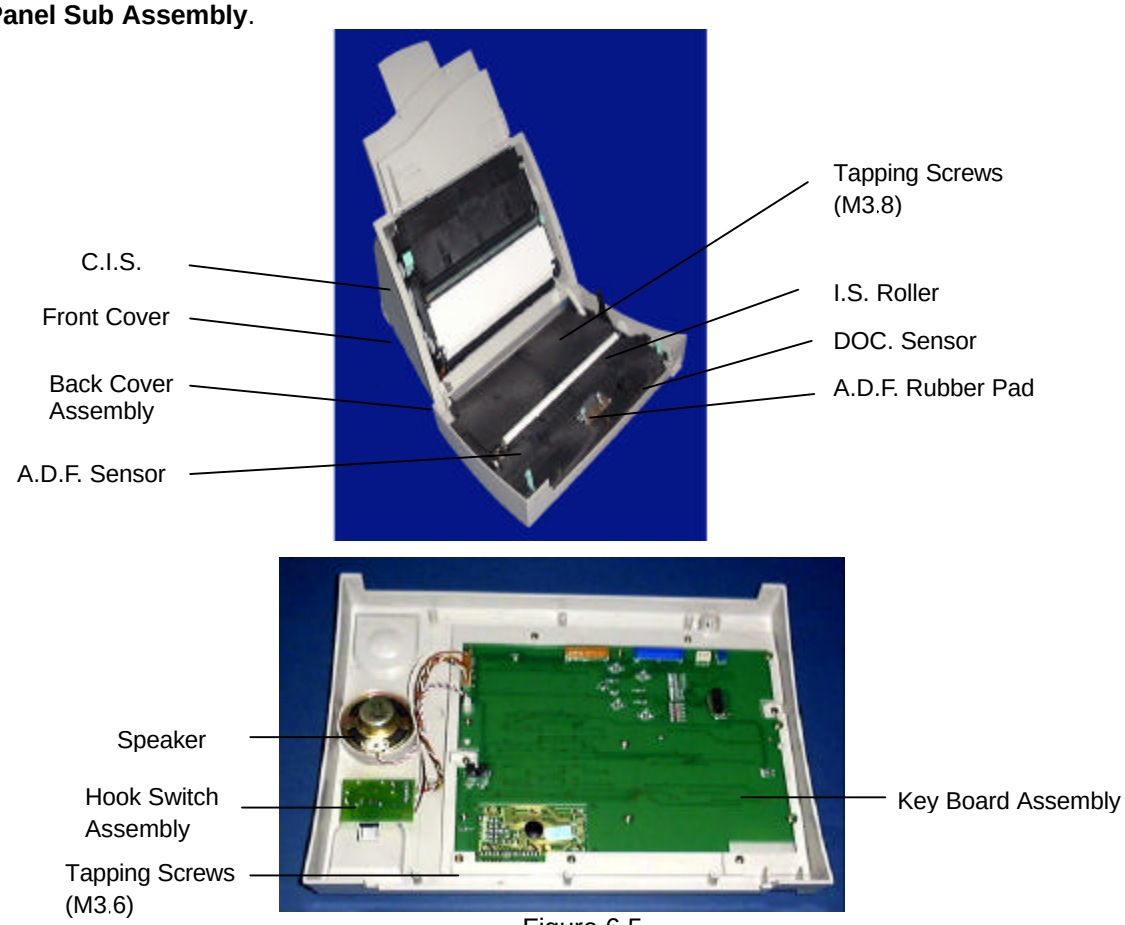


Figure 6.5

(5) Operation Panel Sub Assembly

Loosen 9 pieces of M3.6 tapping screws on keyboard. Then, take out keyboard and rubber pad; and take out keys on **Operation Panel Sub Assembly.**

(6) Front Cover

With a hand, press one side (right or left) of front edge of **Bottom Cover** and **Front Cover.** With another hand, use a straight screwdriver to release its snap-in fingers. Take out **Front Cover**.

6.3.3 Back Cover Assembly

(1) Remove ground wire, then take out ground spring.

(2) Loosen one piece of M2.6.5 tapping screw(with flange) on push button, and take out push button and the catch.

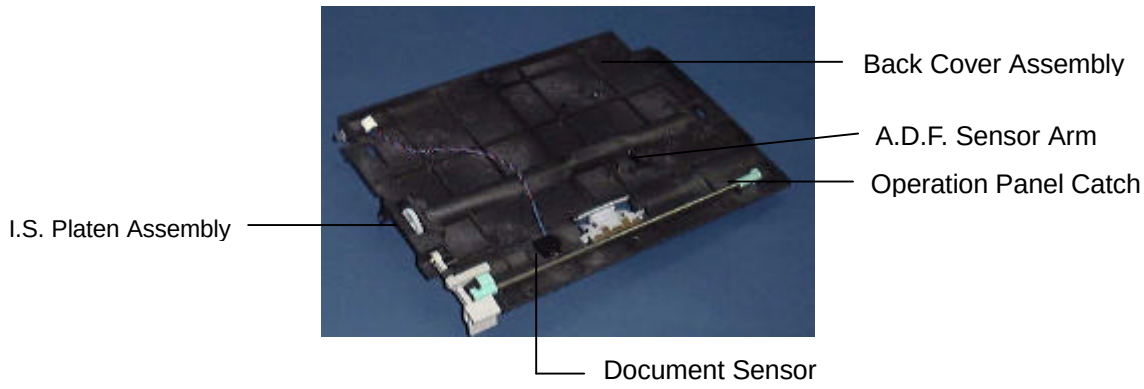


Figure 6.6

(3) Document Sensor

Release its snap-in fingers by a straight screwdriver and remove the sensor.

(4) Separation Assembly

i. Release extension spring from both hooks.

ii. Squeeze the snap-in finger on one side of separation plate and pushes the assembly toward another side, then the assembly can be taken out.

iii. Separate the clamping plate and take out backing plate, separation plate.

(5) **A.D.F Sensor Arm**

Invert the Back Cover Assembly, and push one side of sensor arm to another side. Then take out sensor arm.

(6) **I.S. (Image Sensor) Platen Assembly**

i. Face white I.S. platen and white gear is located on left.

ii. Take the pin sticking out of black bushings on both sides of the platen assembly, out of its holes on back cover and rotate bushings till they have a right angle with back cover, then the assembly can be taken out back cover assembly.

iii. Separate right bushing from I.S. platen. Release the snap-infinger of gear and separate from the shaft of I.S. platen, then take out left bushing.

6.3.4 Ribbon Assembly

(1) Push the button legend to be mould-in and is located on the upper-right corner of operation panel.

(2) With thumbs, push the green right and left catches, have “1” and “2” legend to be mould-in, on both sides of the upper frame assembly to rotate clockwise and with forefingers, hook on the edge of the upper frame. Open the upper frame assembly counterclockwise.

(3) Hook on the take-up bushing assembly with ribbon hook and press the edge of right take-up bushing with fingers, then the take-up ribbon assembly can be taken out of its compartment.

(4) With a hand, holds the take-up ribbon-roll. With another hand, push the pull-side ribbon roll (green retainer is included) towards left and take its right up a little bit. Take the ribbon roll out its compartment from right.

(5) Separate take-up bushing assembly and right take-up bushing from take-up ribbon roll.

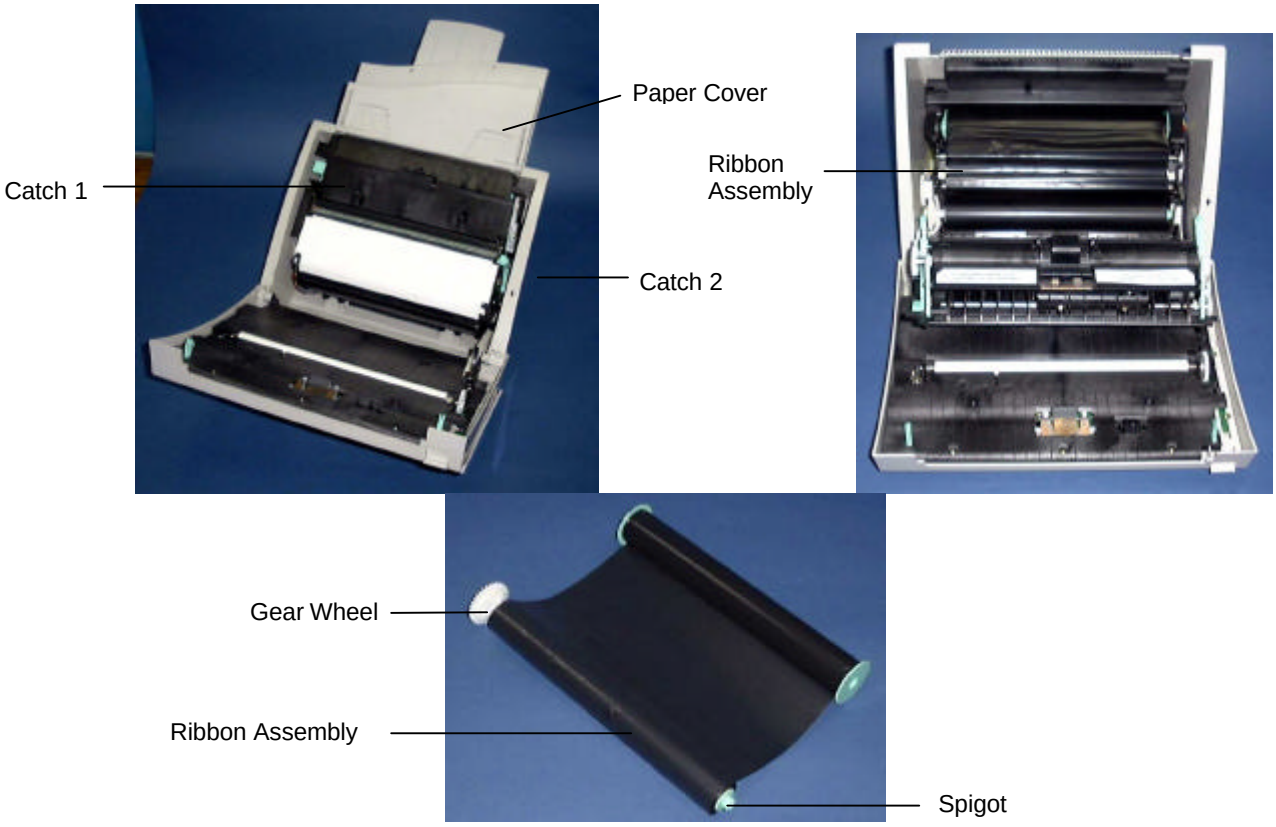


Figure 6.7

6.3.5 Take-up Bushing Assembly

Turn lock-washer until it can be taken out, then take out helical-compression spring, friction plate and gear wheel.

Note: i. Both sides of gear wheel must be sticked on felts, should avoid to touch oil or water before assembling.
ii. The larger coil of helical-compression spring should be touched friction plate after assembled

6.3.6 Paper Tray Assembly

Face the front of machine. Press **Bottom Cover** with two hands, and take out **Paper Tray Assembly** toward yourself with fingers.

i. Paper Cover and Paper Tray

Face the right side of paper tray. With a hand hold paper tray and with another hand hold paper cover, then separation paper cover and paper tray.

ii. Document Guide

Push 2 pieces of document guide to the center of paper cover. Invert paper cover. Loosen one of M2.6.5 tapping screw, and remove gear, then take out 2 pieces of document guide, having a little angle with paper cover.

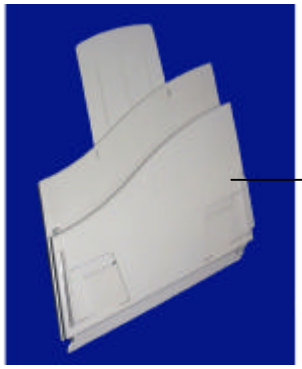


Figure 6.8

6.3.7 Bottom Cover Assembly

(1) Face the scanning face of I.S. and loosen 2 pieces of M3.10 tapping screws on the front edge of frame unit.
(2) Turn the machine to face its bottom, loosen 2 pieces of M3.8 tapping screws.
(3) Turn the machine back and face the scanning face of I.S. again. Separate frame unit with bottom cover assembly.

(4) EPROM Cover

Face the back of bottom cover, using a straight screw-driver to release the fastening, directed by a mould-in triangle of dip switch cover. Remove the switch cover.

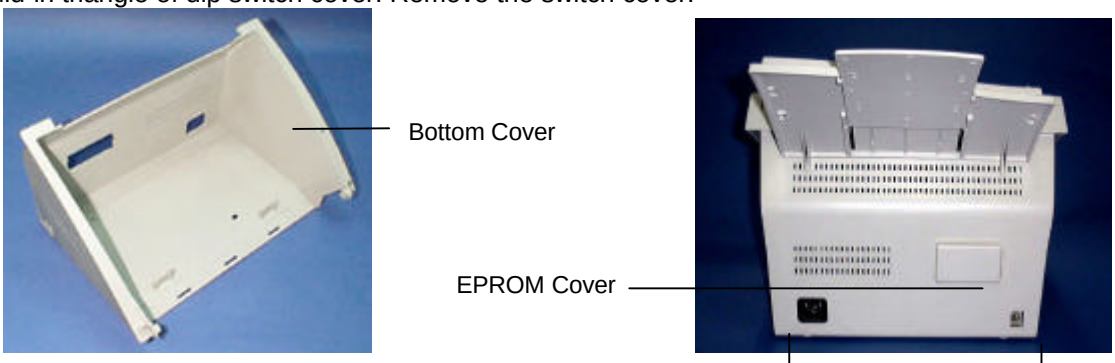


Figure 6.9

6.3.8 Frame Unit

Put the frame unit on table and faces the scanning face of I.S. Cut off all the cable ties around the unit.

(1) Front Cover

Turn the frame unit to face the scanning face of I.S.. Loosen 4 pieces of M3 . 8 tapping screws on both sides of upper frame, take out the cover.

(2) I.S. Assembly

i. Pull out I.S. cable.

ii. Compress both hinges of the assembly a bit and rotates the assembly clockwise until the right hinge can be separated with its spindle on the upper frame, remove the assembly from right slantwise.

iii. Loosen 4 pieces of tapping screws and take out 2 hinges.

(3) Main Board Assembly

Turn the frame unit to face main board assembly. Loosen 5 pieces of M3 . 8 tapping screws and pull out connectors on the assembly. Remove the assembly.

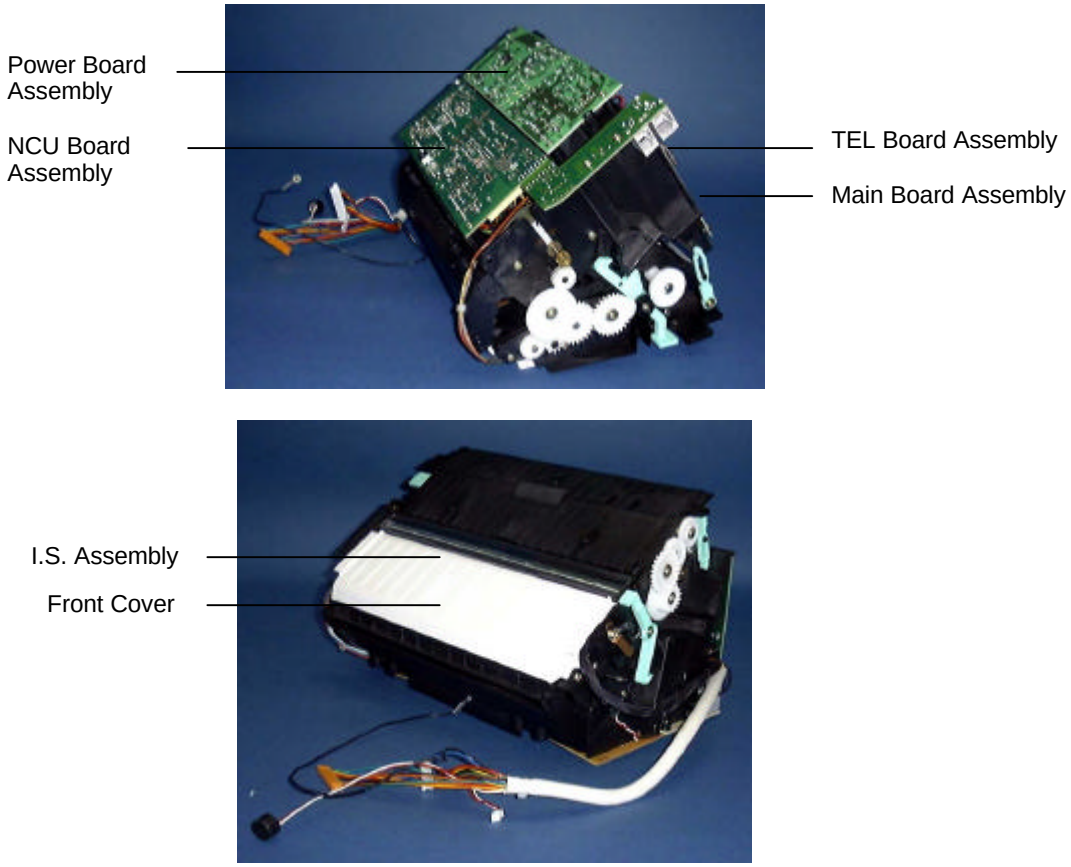


Figure 6.10

6.3.9 Upper Frame Assembly

(1) Cut off cable tie and tear off black adhesive plaster, take the cable of A.P.F. sensor out of its constrain-channel on upper frame.

(2) With thumbs, push the green right and left catches, have "**1"** and "**2"** legend to be mould-in, on both sides of the assembly to rotate clockwise and with forefingers, hook on the edge of the upper frame. Open the assembly counterclockwise.

(3) Separate the right a spindle of the assembly with its slot on the lower frame; separate the assembly with lower frame assembly from right.

(4) A.P.F. (Auto Paper Feeding) Sensor

i. Put the upper frame assembly, the track of document towards table, on table.

ii. The sensor is assembled at the center of upper frame. Release its snap-in fingers by a straight screwdriver, and remove the sensor.

(5) Lower Guide Assembly

i. Loosen 2 pieces of M2.6.5 tapping screws on the outside of green release catches. Remove release catches.

ii. Rotate the lower guide assembly until its spindle can be removed from upper frame.

iii. Remove the clamping plate and the separation plate.

iv. With straight screwdriver, push one elastic arm of the A.P.F. backing plate towards another side, take the plate and compression spring out.

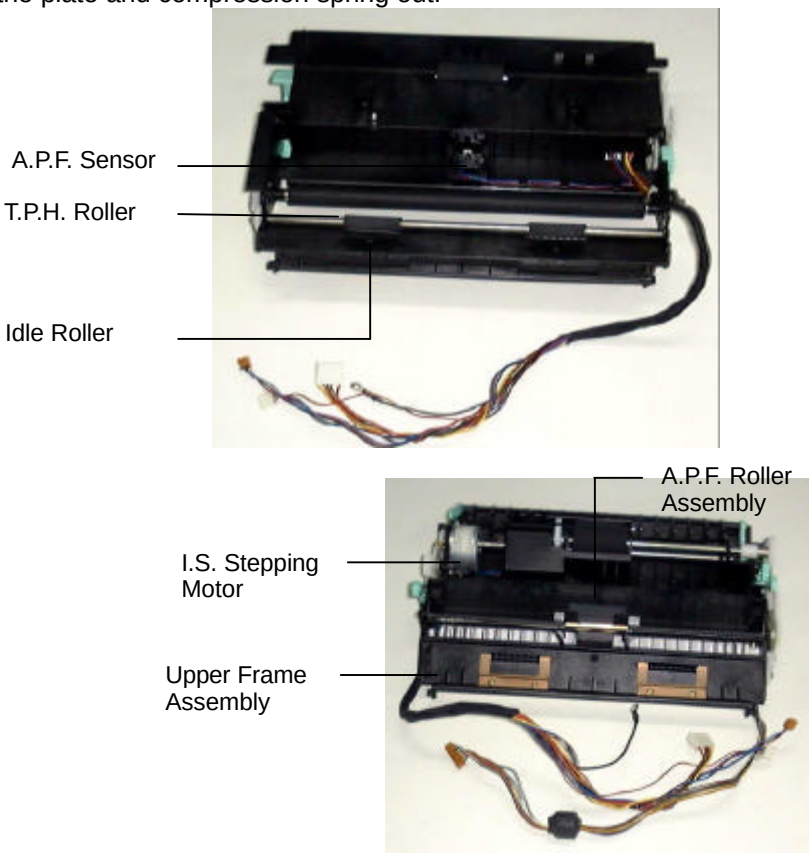


Figure 6.11

(6) Upper Guide Assembly

i. Loosen 3 pieces of M3.8 tapping screws around the assembly.
ii. With straight screwdriver, Separate the pin sticking out of bushing with its holes on upper frame, then rotate the bushing till the upper guide assembly can be removed.
iii. Release the snap-in fingers of paper sensor by a straight screwdriver. Remove the paper sensor.
iv. Take out stud by fingers and separate gear from stud.
v. Push feed roller out of upper guide by fingers and separate gear from feed roller.
vi. With straight screwdriver, Separate the pin sticking out of bushing with its holes on upper guide, then rotate the bushing till the A.P.F. roller assembly can be taken out from upper guide.

(7) A.P.F. (Auto paper feeder) Roller Assembly

i. Release the snap-in finger of gear on the side toward rubber roller of the assembly, take out gear and bushing from the assembly.
ii. Release the "**E"** ring on the outside of another gear by straight screwdriver, take out gear, clutch spring, clutch bushing and bushing.

. *Note: The pin sticking out of bushings should be toward outside of the assembly after assembled.*

(8) Gear Train of I.S. and A.D.F., I.S. Stepping motor

i. The gear-train is assembled on one side of the upper frame that the ϕ 35 mm stepping motor is included. Loosen all the M2.6.5 tapping screws on the outside of gears, remove gears.
ii. Loosen 2 pieces of M3.6 taptite screws, separate the **I.S.** stepping motor with upper frame.

(9) Right Catch and Right Torsion Spring

The catch is green and has "**2"** legend to be mould-in. Loosen one piece of M2.6.5 tapping screw on the outside of right catch, removes the catch and its torsion spring.

. *Note: i. The shorter side and the longer side of the right torsion spring should touch the upper frame and right-catch after assembled, respectively.*
ii. The hook of right catch should opposite to exit idle after assembled.

(10)A.D.F. (Auto Document Feeder) Roller Assembly

i. Take the pins, sticking out of black bushings on both sides of the assembly, out of their holes on upper frame and rotate bushings to have a right angle with upper frame, then the assembly can be taken out of upper frame.
ii. Remove a black bushing on one side of the assembly. Release the "**E"** ring on the outside of gear by straight screwdriver, takes out gear, clutch spring, clutch bushing, clutch and another bushing.

. *Note: The pin sticking out of bushings should be toward outside of the assembly after assembled.*

(11)T.P.H. Platen Assembly

i. Use a straight screwdriver to push the hook of bushings on both sides of the assembly out of its slot on the upper frame, take out the assembly.
ii. Remove a black bushing on one side of the assembly. Release the snap-in finger of gear, takes out gear and another bushing. (Figure 6.11)

(12)Gear-Train of T.P.H. and A.P.F., Left Catch and Left Torsion Spring

i. The gear train is assembled on one side of the upper frame that has no stepping motor. Loosen all the M2.6.5 tapping screws, remove gears.
ii. Take out the green left-catch, having "**1"** legend to be mould-in, and left torsion spring from upper frame and Separate each other.

Note: i. The shorter side and longer side of the left torsion spring should touch the upper frame and left catch after assembled, respectively.

ii. The hook of left catch should opposite to exit idle after assembled.

Figure 6.12

(13)Exit Idle and Idle Plates

Loosen 4 pieces of M2.6 . 5 tapping screws on idle plates, remove idle plates and exit idles.

(14)Exit Roller

Invert upper frame. Push the pin sticking out of bushings on both sides of the roller out from their holes on upper frame by appropriate tool, take the roller out from upper frame and remove bushings from both sides of the roller.

. *Note: The pin sticking out of bushings should be toward outside after assembled on the roller.*

6.3.10 Lower Frame Assembly

(1) Power Board

i. Turn the frame unit, the scanning face of I.S. towards table, to face the back of power board. Loosen all the tapping screws of ground wires.

ii. Loosen 4 pieces of M3.8 tapping screws and pull out connectors on the power board. Remove the power board.

(2) N.C.U. Board Assembly

i. Loosen 4 pieces of M3.8 tapping screws and pull out connectors on the power board. Remove the **N.C.U. Board Assembly and Jack Board.**

ii. Separate jack board with N.C.U. board.

(3) Put the assembly on the table and face **T.P.H.**.

(4) Back Tension Retainer

Lift the elastic arm of the retainer, locating on one side of the compartment of pull-side ribbon, a little bit and remove the retainer, helical compression spring.

Note: i. the surface, touching green bushing of pull-side ribbon roll, of the retainer should stick on a felt before assembled.

ii. The larger coil of the helical compression spring should touch the lower frame after assembled.

(5) Gear Train of Take-up Ribbon and T.P.H. Stepping Motor

i. Invert the lower frame to face the T.P.H. stepping motor (ϕ 42 mm). Loosen one piece of M2.6.5 tapping screw on the outside of gear, remove gears.

ii. Loosen 2 pieces of M3.6 taptite screws, then remove the motor.

(6) Peel-off Tension Bar and Tension Bar

Take out peel off tension bar and tension bar out of their holes on lower frame and brackets of T.P.H. assembly, separately.

(7) T.P.H. Assembly

i. Stretch out the elastic arm of brackets on both sides of **T.P.H.** to leave its spindle and turn the assembly until it can be removed from lower frame. Also, 3 pieces of compression springs can be taken out of their holes on lower frame.

ii. Loosen 4 pieces of tapping screws on the bracket, and take out 2 brackets.

(8) Ribbon Sensor

Loosen one M3.8 tapping screw, remove the sensor.

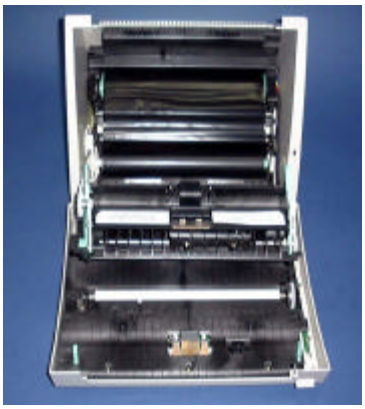
(9) Cover Switch

Turn the lower frame to face the switch on the right of lower frame. Loosen one piece of M2.3.10 tapping screw and take out the switch.

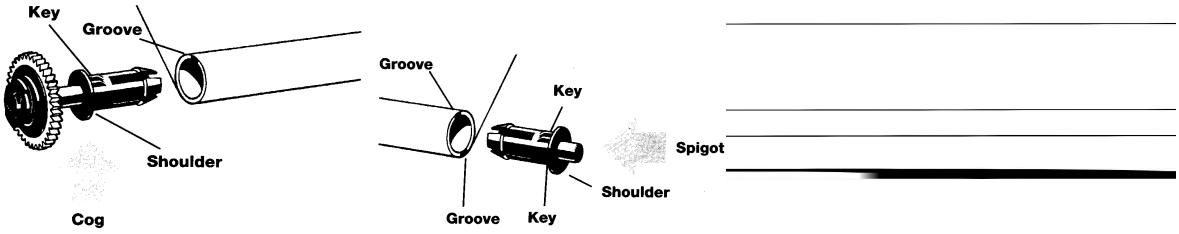
6.4 HOW TO REPLACE THE RIBBON

The “NO RIBBON” message will be shown on the ribbon is exhausted. The ribbon assembly should be replaced according to the following steps:

1. Plug off power.
2. Push the button on the upper-right corner of operation panel after the handset remove from the cradle, and open the operation panel.



3. With thumbs, push the Right and left catches that have “1” and “2” legend to be mould-in located on both sides of the upper frame assembly to rotate clockwise. With forefingers, hook on the edge of upper frame, open the upper frame assembly counterclockwise.
4. Hook on the tale-up bushing assembly with ribbon hook and press the edge of right take-up bushing with fingers, then the take-up ribbon assembly can be taken out of its compartment.
5. Hold on the take-up ribbon-roll with one hand. With another hand, push the pull-side ribbon roll (green retainer is included) agornet left side, then take out the pull-side ribbon roll from its compartment slantwise.
6. Separate the take-up bushing assembly and right take-up bushing with the exhausted ribbon assembly and assemble on new one.



7. Close the upper frame assembly and operation panel by pressing down firmly on the sides with both hands. Put back the handset to cradle.

Note: i. The take-up bushing assembly, including gear wheel. Should be assembled on the side, having two slots, of the take-up ribbon roll. The right take-up bushing should be assembled on another side, just one slot, of the take-up ribbon roll.

ii. The green bushings of the pull-side ribbon roll are included in the new ribbon assembly, so the old ones can be discarded.

6.5 HOW TO RETREAT THE PAPER JAM

1. Lift the top face of paper on paper tray then pull the bundle of paper to completely release it, push down the button to open the operation panel after the handset remove from the cradle, and open the operation panel.
2. With thumbs, push the Right and left catches that have “1” and “2” legend to be mould-in located on both sides of the upper frame assembly to rotate clockwise. With forefingers, hook on the edge of upper frame, open the upper frame assembly counterclockwise.
3. Release the paper feed cover at green clip and pull out the jam paper.
4. Reclose the paper feed cover, upper frame and operation panel.

CHAPTER 7

MECHANICAL ASSEMBLY DRAWING AND PARTS LIST

7-1 OKIFAX 610 APPEARANCE……..……...1

7-2 OKIFAX 660 APPEARANCE……..…...2

7-3 OKIFAX 610 FACSIMILE UNIT……3

7-4 OKIFAX 660 FAXSIMILE UNIT……..…..……4

7-5 OKIFAX 610 OPERATION PANEL ASM'……..…..…..……5

7-6 OKIFAX 660 OPERATION PANEL ASM'……..…….6

7-7 OKIFAX 610 MAIN BODY UNIT……...7

7-8 OKIFAX 660 MAIN BODY UNIT……...8

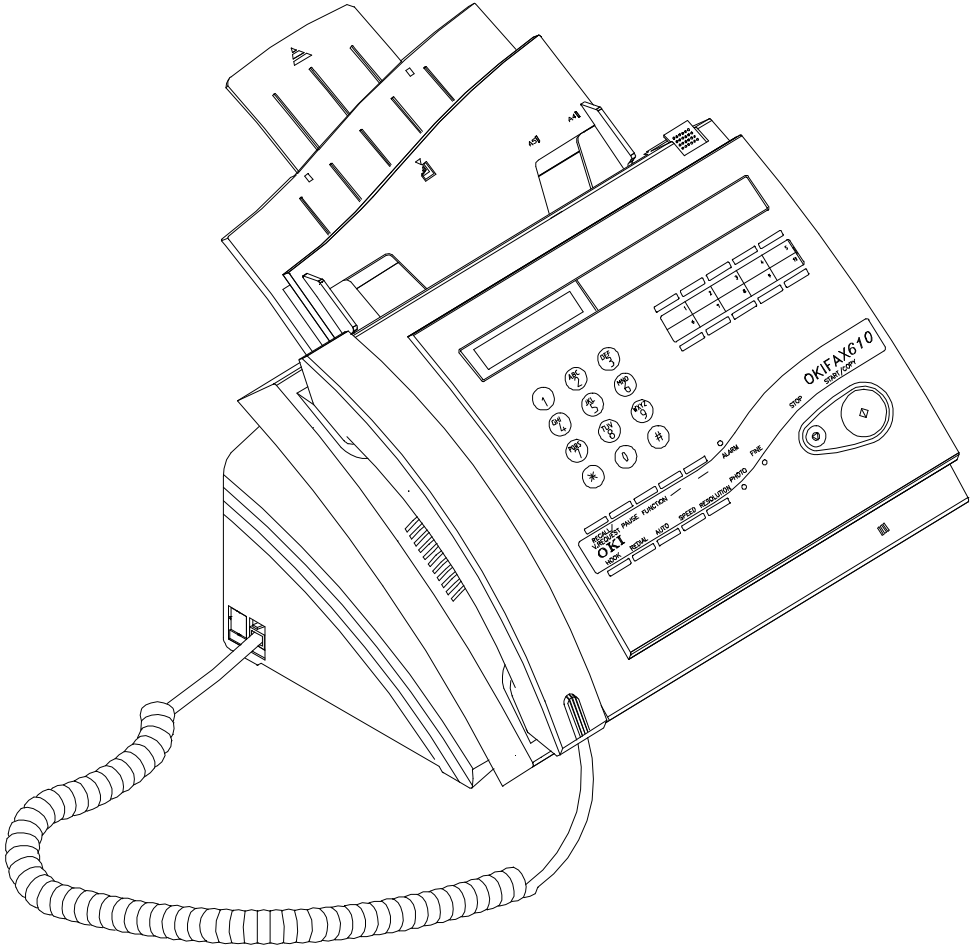
7-9 BACK COVER ASM'……...9

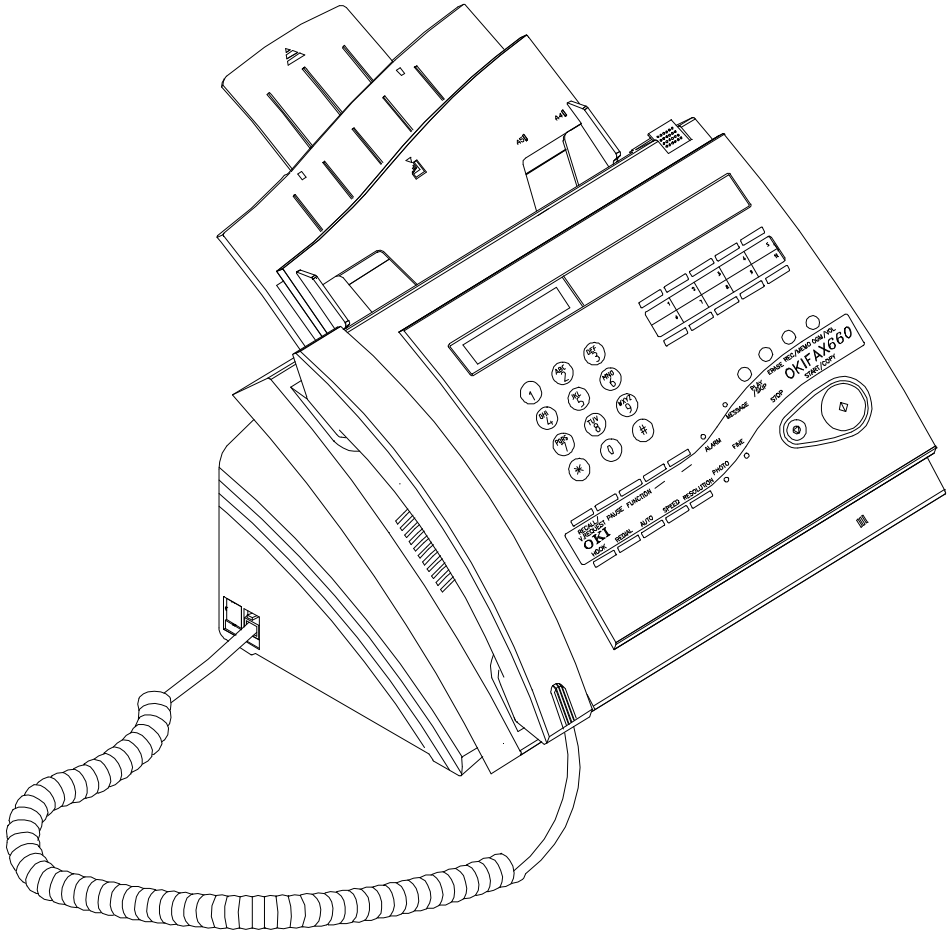
7-10 UPPER FRAME ASM'……10

7-11 UPPER GUIDE ASM'…….11

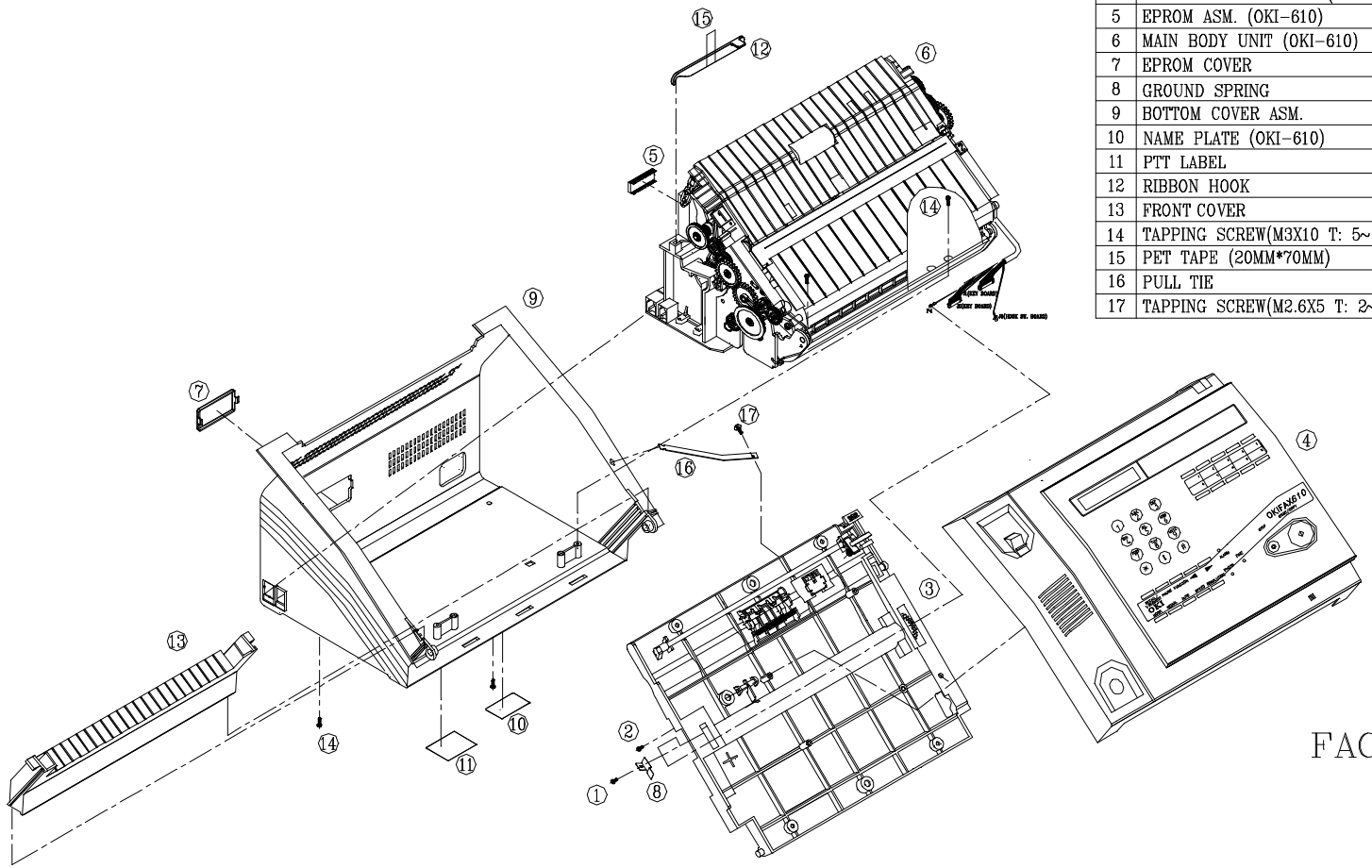
7-12 LOWER FRAME ASM'……..12

7-13 LOWER GUIDE ASM'……13


OKIFAX610
STOP
ALARM
FINE
PHOTO
RESOLUTION
SPEED
AUTO
REDIAL
PAUSE
FUNCTION
OKI


OKIFAX660
STAND/COPY
STOP
MESSAGE
ALARM
FAX
PHOTO
RESOLUTION
SPEED
AUTO
REDIAL
PAUSE
FUNCTION
OKI

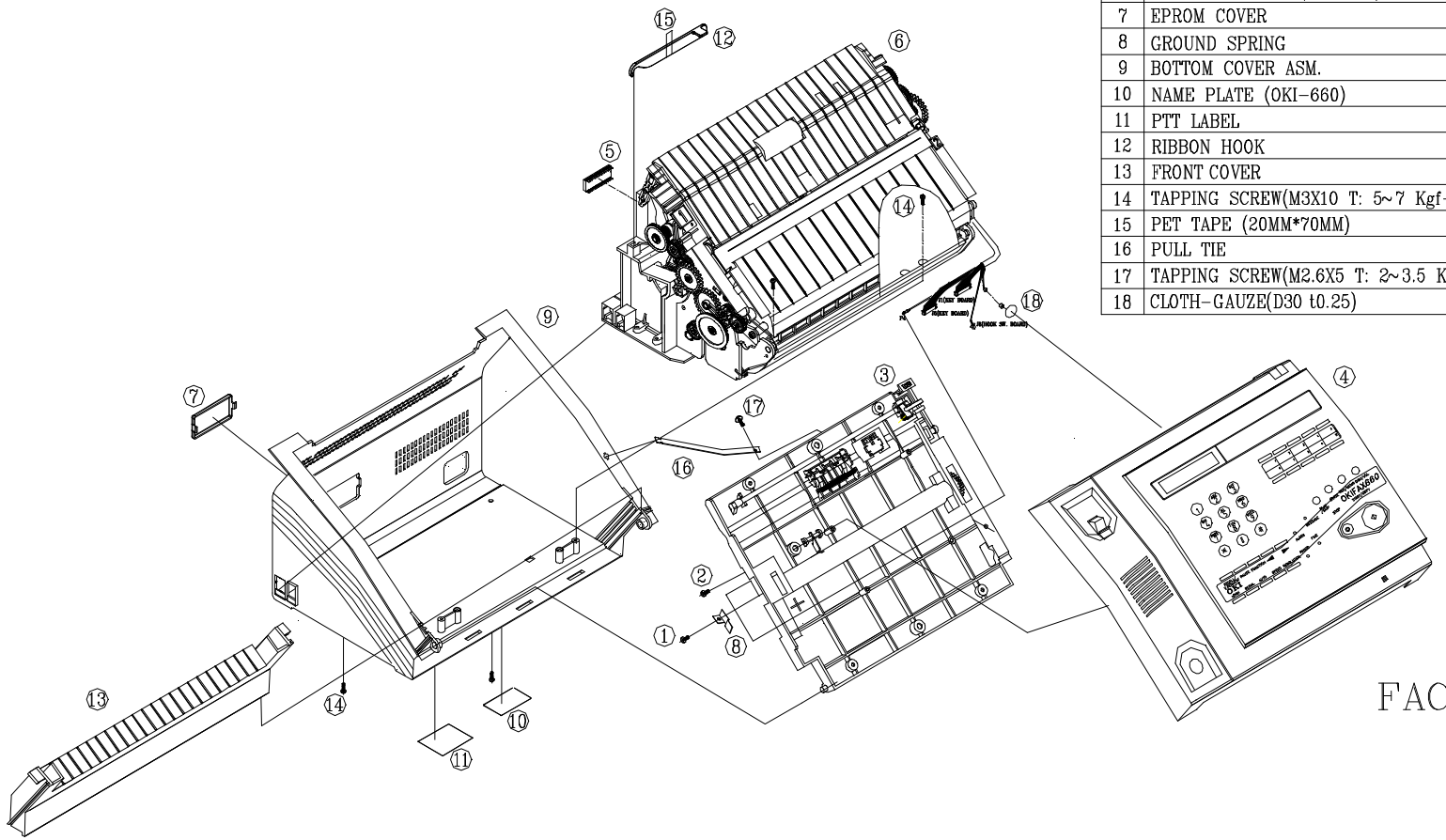
ITEM	NAME	B/M NUMBER	Q'TY
1	TAPPING SCREW(M3X6 T: 5~7 Kgf-cm)	7190050304	1
2	TAPPING SCREW(M3X8 T: 5~7 Kgf-cm)	7190050305	6
3	BACK COVER ASM.	0482346310	1
4	OPERATION PANEL ASM.(OKI-610)	0482346330	1
5	EPROM ASM. (OKI-610)	0482347800	1
6	MAIN BODY UNIT (OKI-610)	0482346340	1
7	EPROM COVER	0482370010	1
8	GROUND SPRING	0482345617	1
9	BOTTOM COVER ASM.	0482346320	1
10	NAME PLATE (OKI-610)	0482347610	1
11	PTT LABEL	0482347660	1
12	RIBBON HOOK	0482345517	1
13	FRONT COVER	0482346530	1
14	TAPPING SCREW(M3X10 T: 5~7 Kgf-cm)	7190050306	4
15	PET TAPE (20MM*70MM)	0482345730	1
16	PULL TIE	0482346536	1
17	TAPPING SCREW(M2.6X5 T: 2~3.5 Kgf-cm)	0482350640	1



FACSMILE UNIT

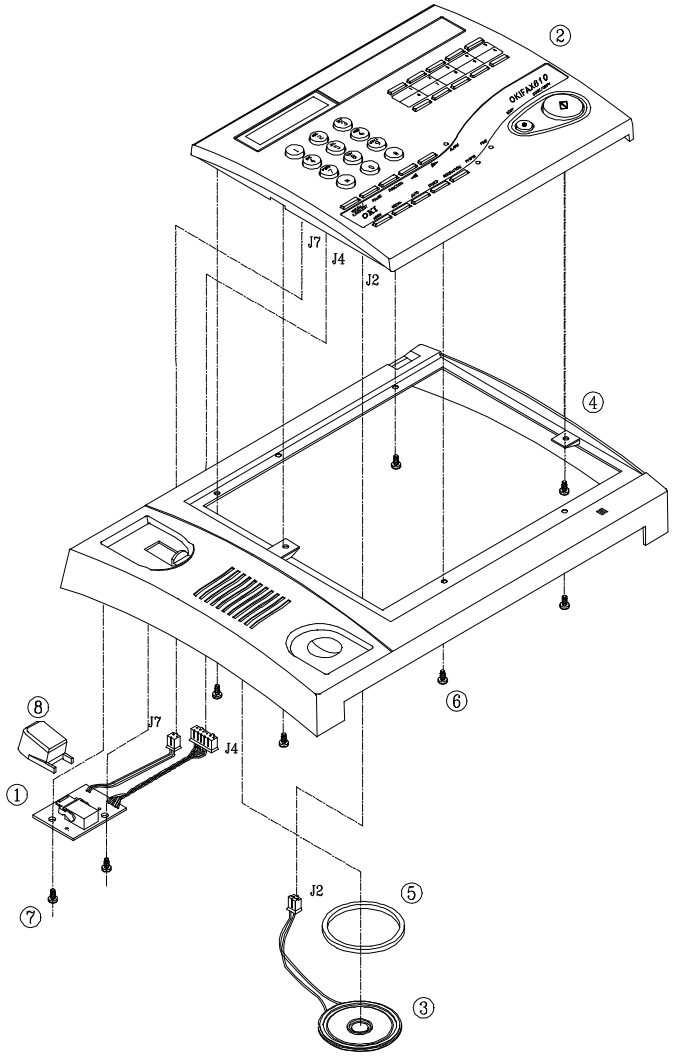
(OKIFAX 610)

ITEM	NAME	B/M NUMBER	Q'TY
1	TAPPING SCREW(M3X6 T: 5~7 Kgf-cm)	7190050304	1
2	TAPPING SCREW(M3X8 T: 5~7 Kgf-cm)	7190050305	6
3	BACK COVER ASM.	0482346310	1
4	OPERATION PANEL ASM.(OKI-660)	0482346335	1
5	EPROM ASM. (OKI-660)	0482347900	1
6	MAIN BODY UNIT (OKI-660)	0482346350	1
7	EPROM COVER	0482370010	1
8	GROUND SPRING	0482345617	1
9	BOTTOM COVER ASM.	0482346320	1
10	NAME PLATE (OKI-660)	0482347611	1
11	PTT LABEL	0482347680	1
12	RIBBON HOOK	0482345517	1
13	FRONT COVER	0482346530	1
14	TAPPING SCREW(M3X10 T: 5~7 Kgf-cm)	7190050306	4
15	PET TAPE (20MM*70MM)	0482345730	1
16	PULL TIE	0482346536	1
17	TAPPING SCREW(M2.6X5 T: 2~3.5 Kgf-cm)	0482350640	1
18	CLOTH-GAUZE(D30 t0.25)	0482352002	1



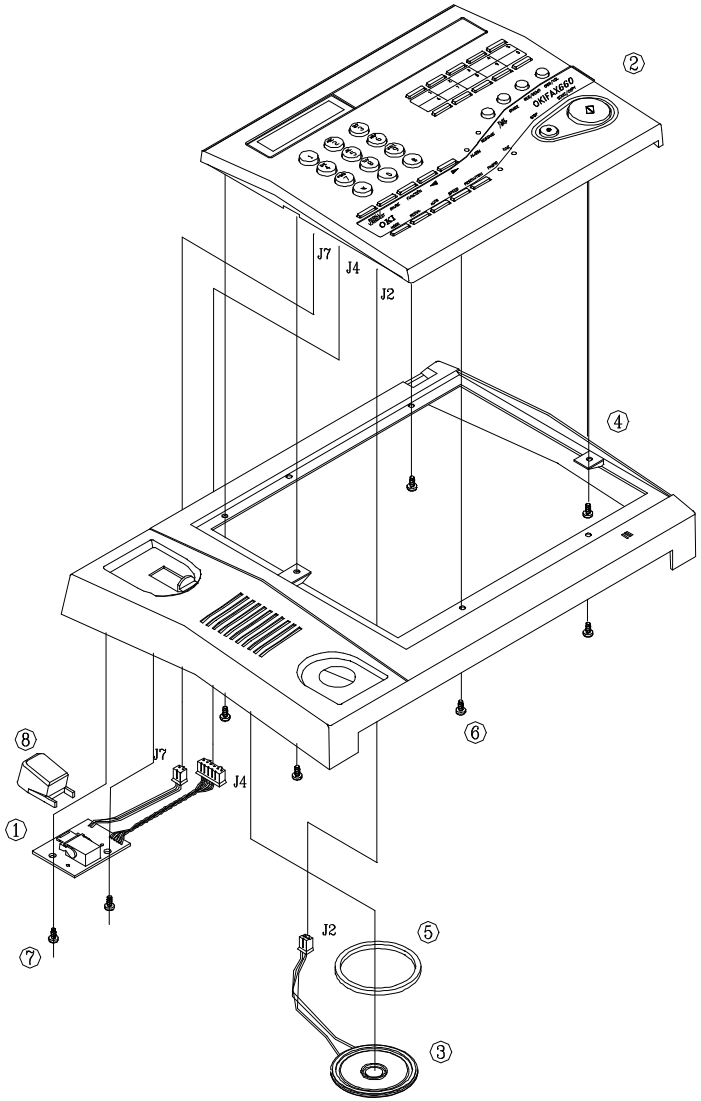
FACSMILE UNIT

(OKIFAX 660)



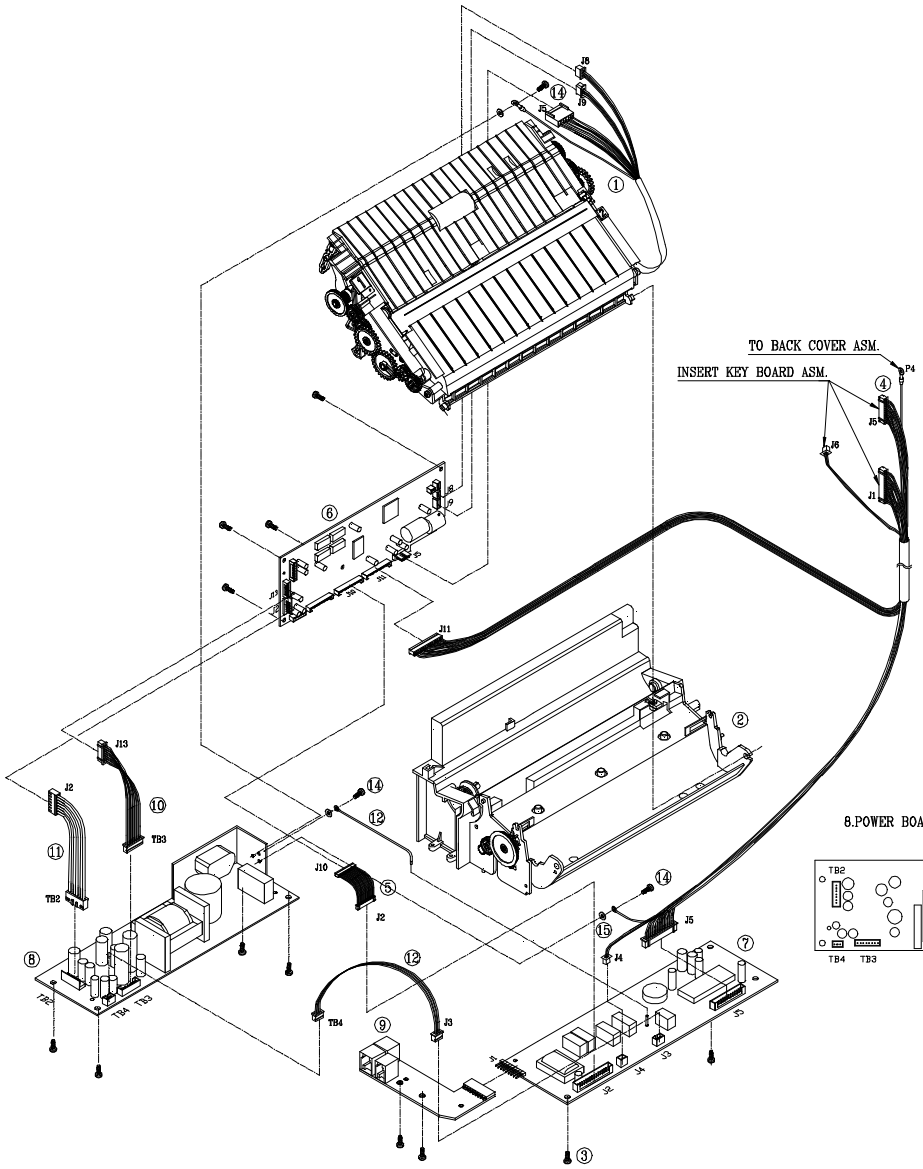
ITEM	NAME	B/M NUMBER	Q'TY
1	HOOK SWITCH ASM.	0482347470	1
2	OPERATION PANEL SUB ASM.	0482346370	1
3	SPEAKER ASM.	0482345008	1
4	UPPER COVER	0482346580	1
5	EVA	0482345937	1
6	TAPPING SCREW (M3X6 ㎜: 5~7 Kgf-cm)	7190050304	6
7	TAPPING SCREW (M2.6X6 ㎜: 1.5~2.5 Kgf-cm)	7031130652	2
8	HOOK SW. CAP	0482346590	1

OPERATION PANEL ASM.
(OKIFAX 610)



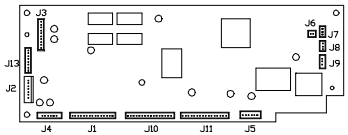
ITEM	NAME	B/M NUMBER	Q'TY
1	HOOK SWITCH ASM.	0482347470	1
2	OPERATION PANEL SUB ASM.	0482346380	1
3	SPEAKER ASM.	0482345008	1
4	UPPER COVER	0482346580	1
5	EVA	0482345937	1
6	TAPPING SCREW (M3X6 ℓ.O: 5~7 Kgf-cm)	7190050304	6
7	TAPPING SCREW (M2.6X6 ℓ.O: 1.5~2.5 Kgf-cm)	7031130652	2
8	HOOK SW. CAP	0482346590	1

OPERATION PANEL ASM.
(OKIFAX 660)

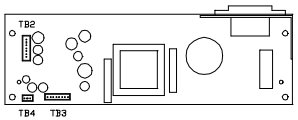


ITEM	NAME	B/M NUMBER	Q'TY
1	UPPER FRAME ASM.	0482346075	1
2	LOWER FRAME ASM.	0482346066	1
3	TAPPING SCREW (M3X8 ›O: 9~11 Kgf-cm)	7190050305	12
4	CABLE ASM. (K/B-M/B-TEL/B)(OKI-610)	0482347119	1
5	CABLE ASM. (NCU-M/B)(16P)	0482347115	1
6	MAIN BOARD ASM.(OKI-610)	0482347020	1
7	NCU/TEL BOARD ASM. (OKI-610)	0482347200	1
8	POWER BOARD ASM.	6930010100	1
9	LINE SOCKET ASM.	0482347440	1
10	CABLE ASM. (POWER-M/B)(8P)	0482347107	1
11	CABLE ASM. (POWER-M/B)(7P)	0482347114	1
12	CABLE ASM. POWER-NCU (GROUND WIRE)	0482347111	1
13	CABLE ASM. POWER-NCU (3P)	0482347102	1
14	TAPPING SCREW (M3X6 ›O: 8~9.5 Kgf-cm)	7131160652	3
15	WASHER M3.0	7101100302	3

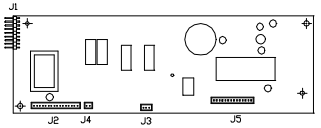
6. MAIN BOARD ASM. (OKI-610)



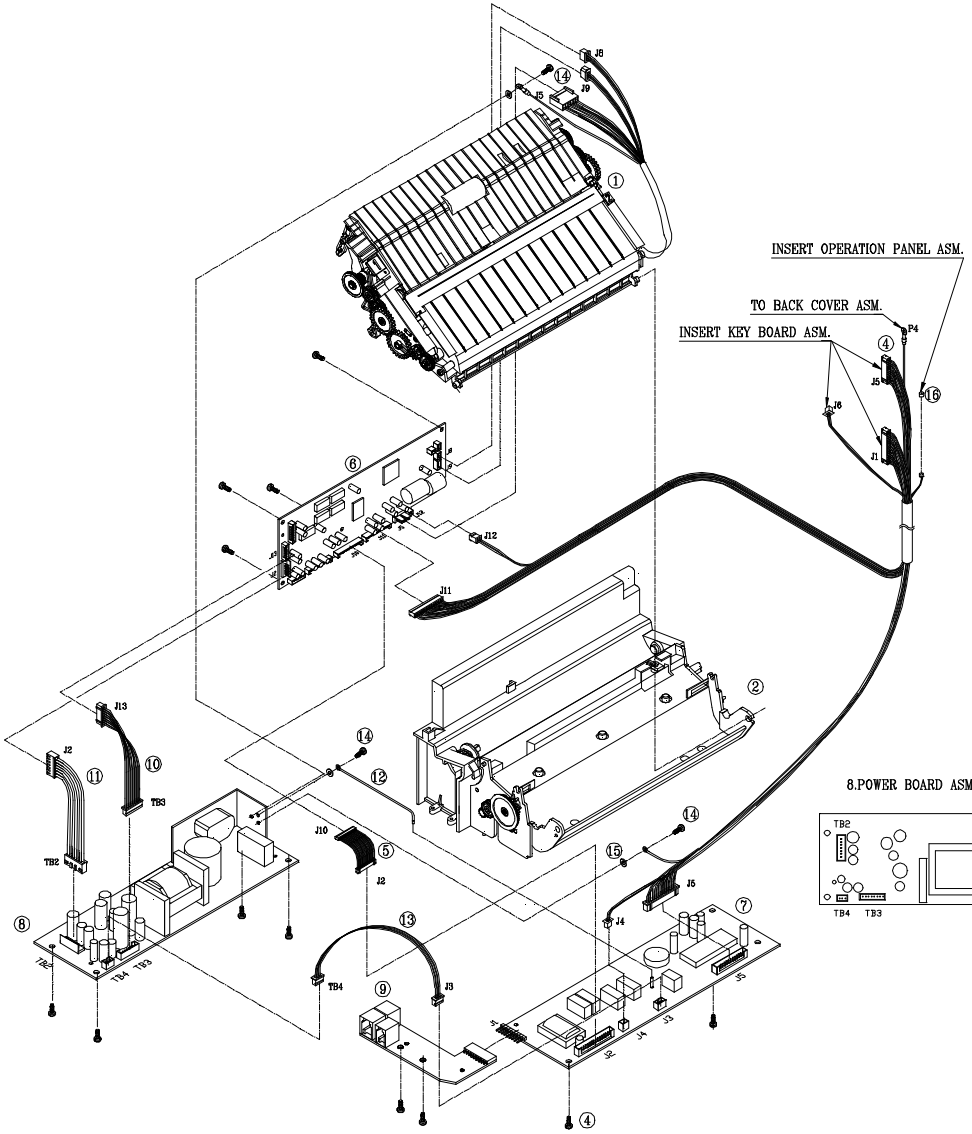
8.POWER BOARD ASM.



7. NCU/TEL BOARD ASM.

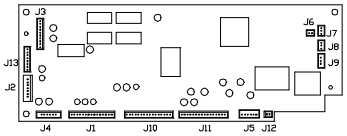


MAIN BODY UNIT
(OKIFAX 610)

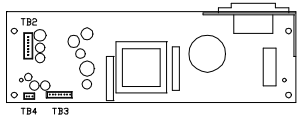


ITEM	NAME	B/M NUMBER	Q'TY
1	UPPER FRAME ASM.	0482346075	1
2	LOWER FRAME ASM.	0482346066	1
3	TAPPING SCREW (M3X8 ㄱ0: 9~11 Kgf-cm)	7190050305	12
4	CABLE ASM. (K/B-M/B-TEL/B-MIC)(OKI-660)	0482347117	1
5	CABLE ASM. (NCU-M/B)(16P)	0482347115	1
6	MAIN BOARD ASM.(OKI-660)	0482347021	1
7	NCU/TEL BOARD ASM. (OKI-660)	0482347250	1
8	POWER BOARD ASM.	6930010100	1
9	LINE SOCKET ASM.	0482347440	1
10	CABLE ASM. (POWER-M/B)(8P)	0482347107	1
11	CABLE ASM. (POWER-M/B)(7P)	0482347114	1
12	CABLE ASM. (POWER-NCU) (GROUND WIRE)	0482347111	1
13	CABLE ASM. (POWER-NCU) (3P)	0482347102	1
14	TAPPING SCREW (M3X6 ㄱ0: 8~9.5 Kgf-cm)	7131160652	3
15	WASHER M3.0	7101100302	3
16	MIC. HOLDER	0482352011	1

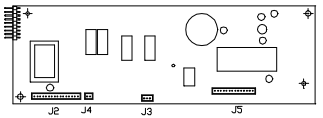
6. MAIN BOARD ASM. (OKI-660)



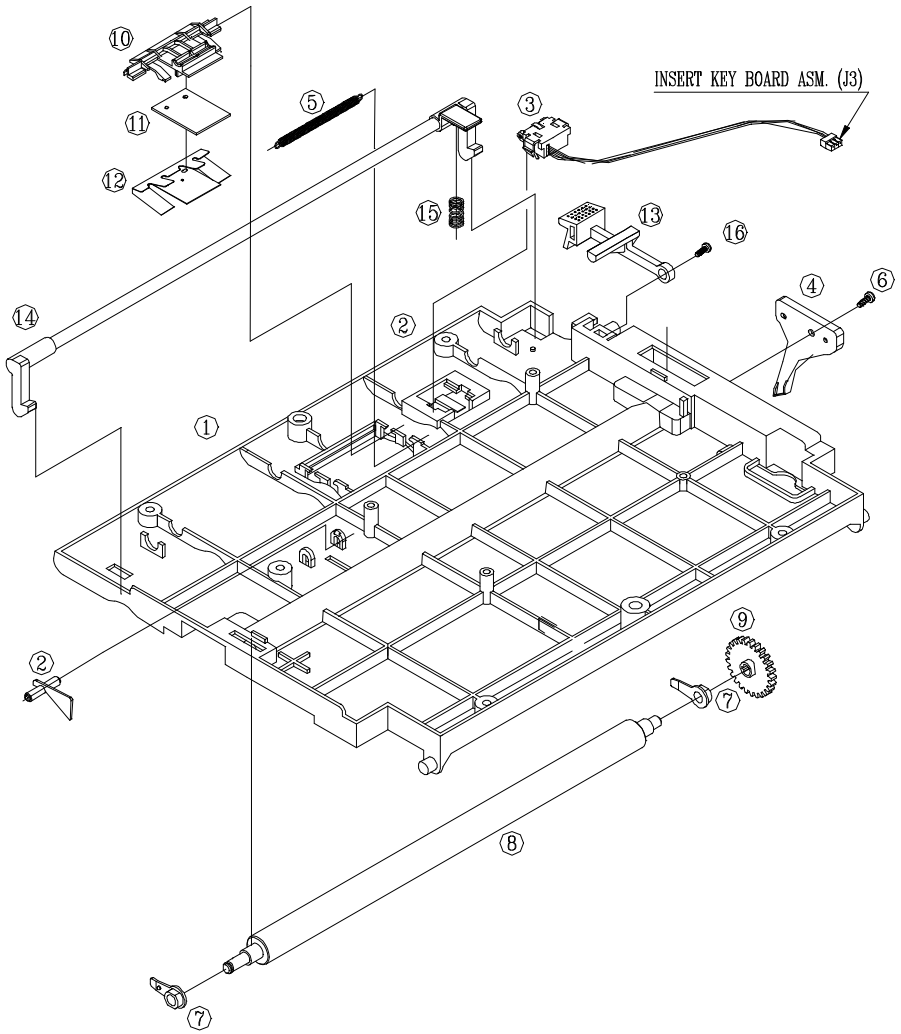
8.POWER BOARD ASM.



7. NCU/TEL BOARD ASM.

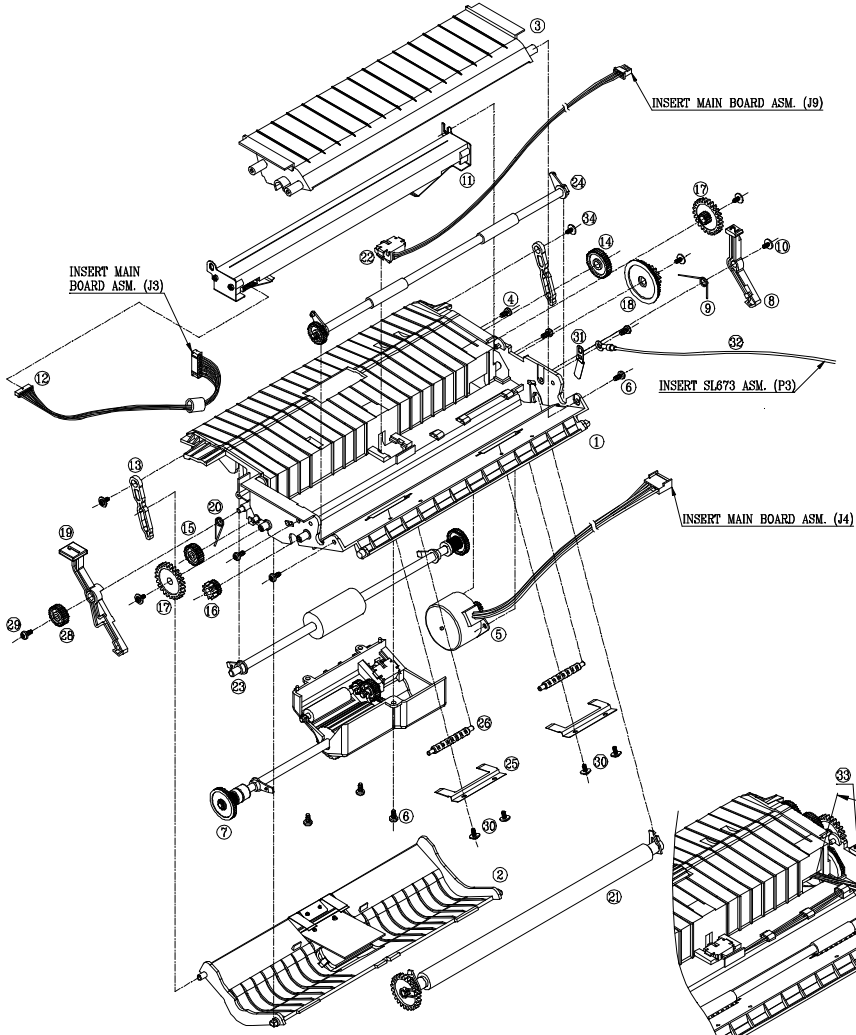


MAIN BODY UNIT
(OKIFAX 660)



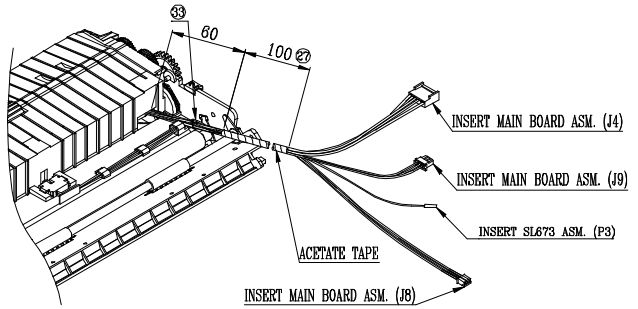
ITEM	NAME	B/M NUMBER	Q'TY
1	BACK COVER	0482346560	1
2	ADF SENSOR ARM	0482346563	1
3	DOC. SENSOR ASM.	6942002100	1
4	SWITCH ARM	0482345613	1
5	ADF EXTENSION SPRING	0482351171	1
6	TAPPING SCREW (M3X8 ㅈ0: 8~9.5 Kgf-cm)	7190050305	1
7	BUSHING	0482350401	2
8	I.S. PLATEN	0482345590	1
9	PLATEN DRIVEN GEAR	0482345506	1
10	BACKING PLATE	0482340635	1
11	SEPARATION PLATE	0482345558	1
12	CLAMPING PLATE	0482345619	1
13	BUTTON	0482346562	1
14	O.P. CATCH	0482345615	1
15	COMPRESSION SPRING	0482345585	1
16	TAPPING SCREW (M2.6X5 ㅈ0: 2.5~3.5 Kgf-cm)	0482350640	1

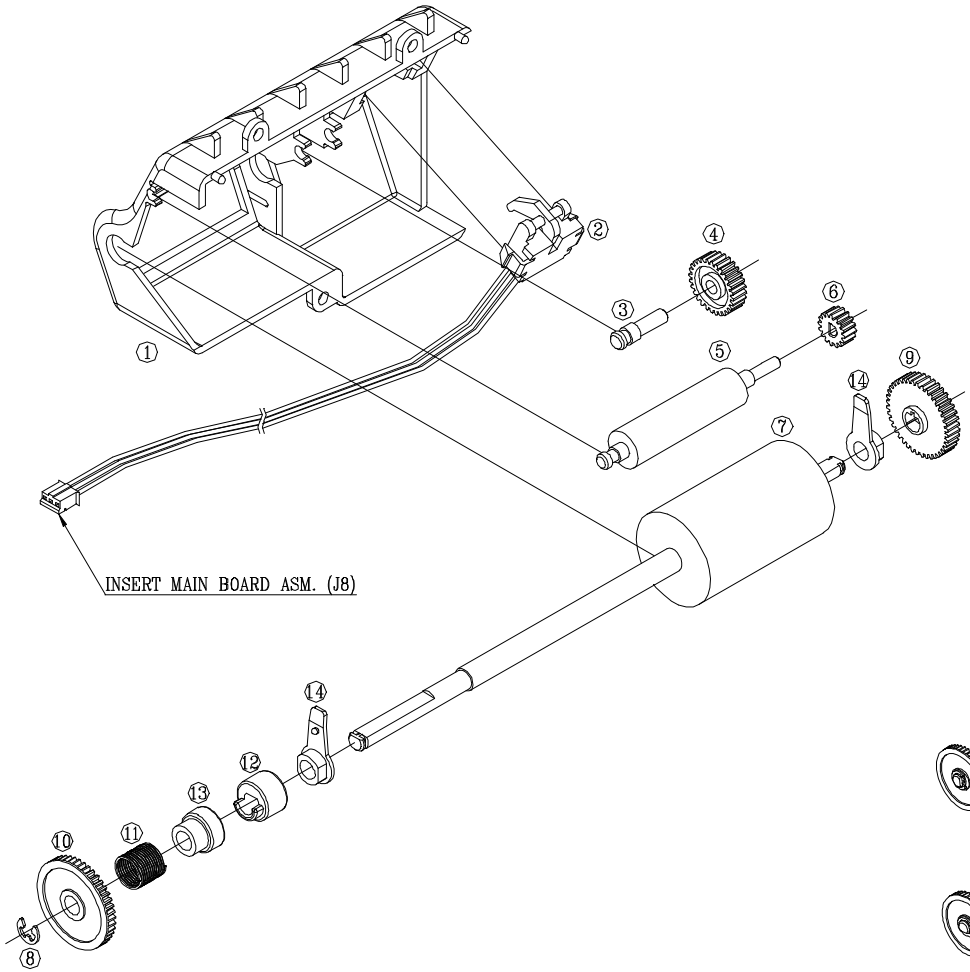
BACK COVER ASM.



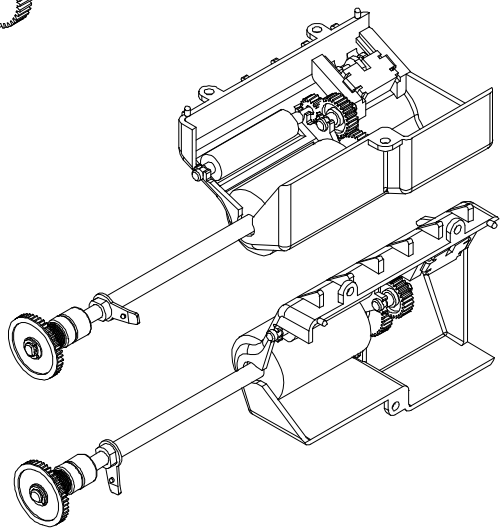
ITEM	NAME	B/M NUMBER	Q'TY
1	UPPER FRAME	0482345520	1
2	LOWER GUIDE ASM.	0482346040	1
3	FRONT COVER	0482345540	1
4	TAPPING SCREW(M3X6 T: 5~7Kgf-cm)	7131160652	2
5	MOTOR (I.S.) (MITSUMI)	0482347112	1
6	TAPPING SCREW(M3X8 T: 5~7Kgf-cm)	7190050305	7
7	UPPER GUIDE ASM.	0482346030	1
8	RIGHT CATCH	0482345538	1
9	RIGHT TORSION SPRING	0482345539	1
10	TAPPING SCREW(M2.6X5 T:2.5~3.5Kgf-cm)	0482350640	7
11	I.S. ASM.	0482346010	1
12	I.S. CABLE CORE ASM.	0482347101	1
13	RELEASE CATCH	0482345516	2
14	IDLE GEAR C	0482345509	1
15	IDLE GEAR D	0482345510	1
16	IDLE GEAR E	0482345511	1
17	IDLE GEAR B	0482345508	2
18	IDLE GEAR F	0482345513	1
19	LEFT CATCH	0482345536	1
20	LEFT TORSION SPRING	0482345537	1
21	T.P.H. PLATEN ASM.	0482346020	1
22	APF SENSOR ASM.	0482345006	1
23	ADF ROLLER ASM.	0482346005	1
24	EXIT ROLLER ASM.	0482346000	1
25	IDLE PLATE	0482345535	2
26	IDLER	0482345512	2
27	ACETATE TAPE	0482355181	
28	IDLE GEAR G	0482345514	1
29	TAPPING SCREW(M2X5 T:2.5~3.5Kgf-cm)	7190048601	1
30	TAPPING SCREW(M2.6X5 T:5~7Kgf-cm)	7031130552	4
31	GROUND SPRING	0482345518	1
32	POWER / T.P.H. GROUND WIRE	0482347105	1
33	CABLE TIE	0482300497	1

UPPER FRAME ASM.

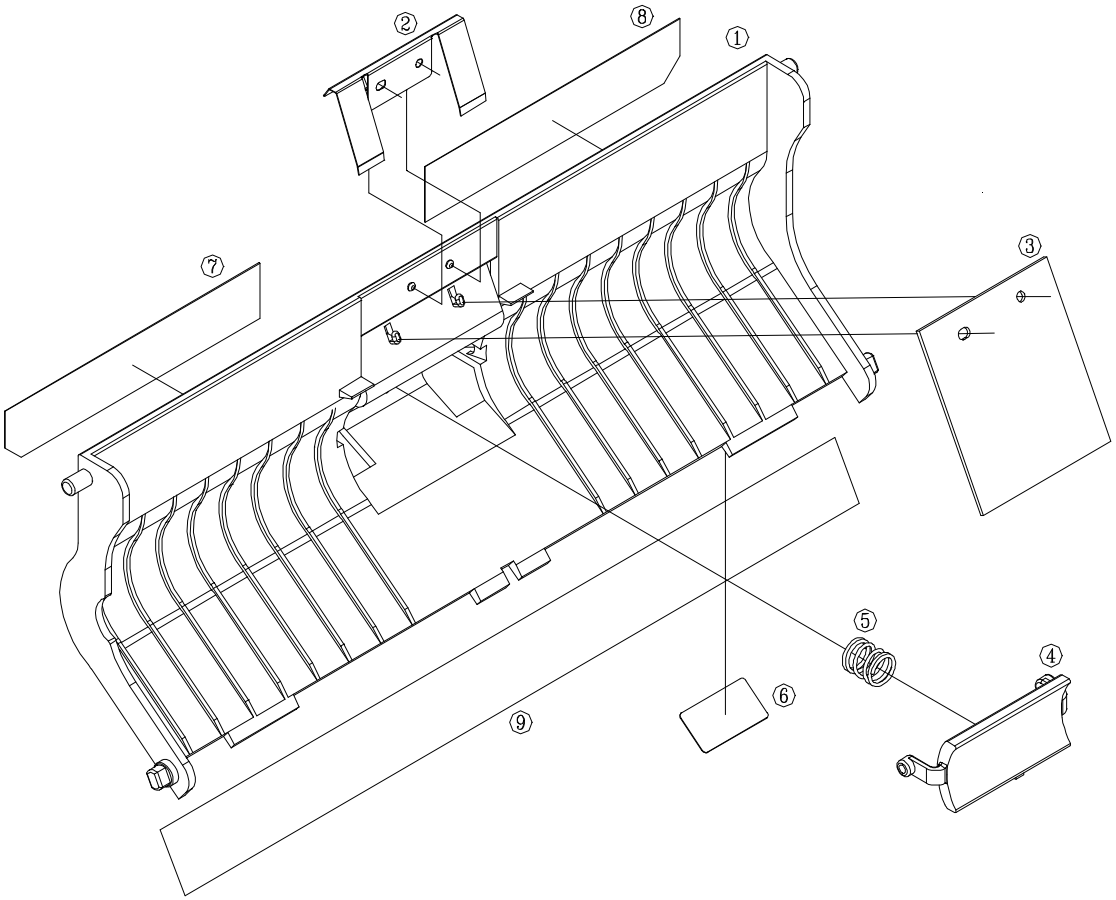




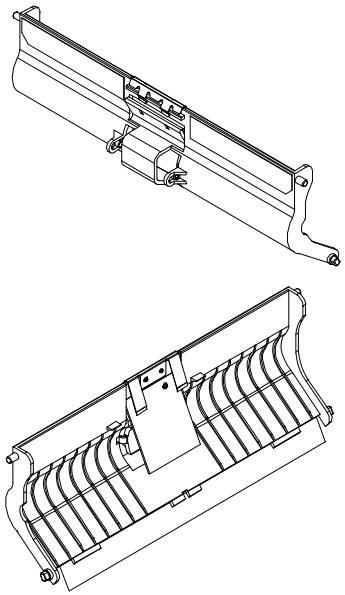
ITEM	NAME	B/M NUMBER	Q'TY
1	UPPER GUIDE	0482345564	1
2	PAPER SENSOR ASM.	0482345001	1
3	GEAR STUD	0482345560	1
4	IDLE GEAR D	0482345510	1
5	FEED ROLLER	0482345561	1
6	FEED GEAR	0482345563	1
7	APF ROLLER	0482345500	1
8	E-RING (ø3)	7105300302	1
9	TRANSMIT GEAR	0482345502	1
10	APF DRIVEN GEAR	0482345505	1
11	CLUTCH SPRING	0482322430	1
12	CLUTCH	0482345503	1
13	CLUTCH BUSHING	0482345504	1
14	BUSHING	0482350401	2



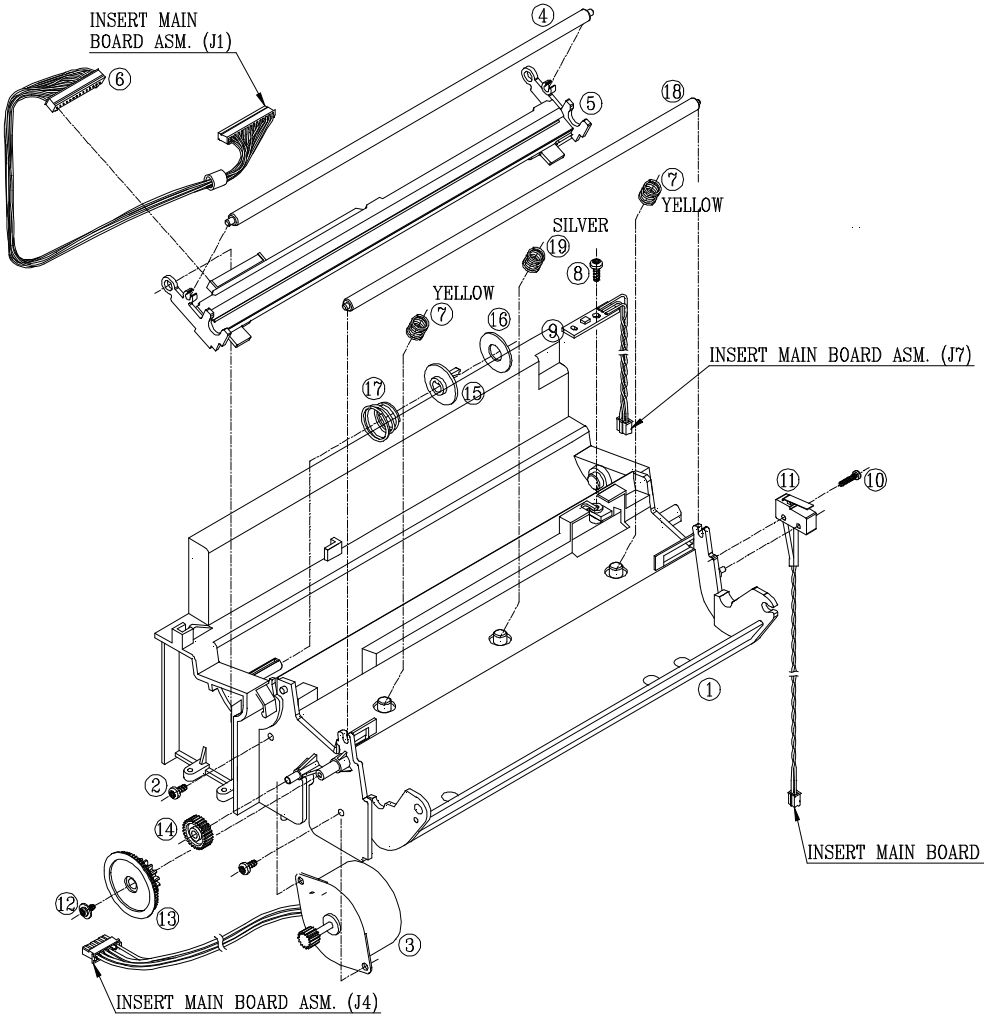
UPPER GUIDE ASM.



MODEL		OKIFAX 610/660	
DWG. NO.		0482346040	
ASM. DWG. NO.		0482346075	
ITEM	NAME	B/M NUMBER	Q'TY
1	LOWER GUIDE	0482345550	1
2	APF CLAMPING PLATE	0482345557	1
3	APF SEPARATION PLATE	0482345551	1
4	APF BACKING PLATE	0482345553	1
5	COMPRESSION SPRING	0482345554	1
6	REFLECTION LABEL	0482345555	1
7	PAPER RELEASE LABEL-LEFT	0482345955	1
8	PAPER RELEASE LABEL-RIGHT	0482345956	1
9	PAPER GUIDE SHEET	0482345566	1



LOWER GUIDE ASM.



ITEM	NAME	B/M NUMBER	Q'TY
1	LOWER FRAME SUB ASM.	0482346068	1
2	TAPTITE SCREW (M3X6 T: 8~10 Kgf-cm)	7131160652	2
3	MOTOR (T.P.H.)(MITSUMI)	0482345041	1
4	TENSION BAR	0482345575	1
5	T.P.H. ASM.	0482346050	1
6	T.P.H. CABLE CORE ASM.	0482345023	1
7	T.P.H. COMPRESSION SPRING -RIGHT/LEFT	0482345585	2
8	TAPPING SCREW (M3X8 T: 8~10 Kgf-cm)	7190050305	1
9	RIBBON SENSOR ASM.	0482345003	1
10	TAPPING SCREW (M2.3X10 T: 2~3 Kgf-cm)	7190050303	1
11	COVER SWITCH ASM.	0482340010	1
12	TAPPING SCREW (M2.6X5 T: 2.5~3.5 Kgf-cm)	0482350640	1
13	IDLE GEAR A	0482345507	1
14	IDLE GEAR D	0482345510	1
15	BACK TENSION RETAINER	0482345580	1
16	FRICTION PAD	0482345582	1
17	RIBBON TENSION SPRING	0482345583	1
18	PEEL OFF TENSION BAR	0482345576	1
19	T.P.H. COMPRESSION SPRING -CENTER	0482345586	1

LOWER FRAME ASM.

CHAPTER 8

CIRCUIT DESCRIPTION

8.1 MOTHER BOARD CIRCUIT (OKIFAX 610)

The mother board version 7XFEMV05 is the first version that begins mass-production and the circuit diagrams consists of 11 schematics which are described in the following sections.

8.1.0 Block Diagram (sheet 0/10)

The extended FAXENGINE chip set consists of a Integrated Fax Controller (XFC-MV) and a modem chip (RF144EFXL). The XFC provides built-in programmable hardware registers to control and monitor peripheral functions, such as scanner, printer, motors, cutter, power, modem, memory and operation panel. The modem chip includes an advanced voice compression algorithm which performs built-in digital answering machine.

8.1.1 Integrated Fax Controller (sheet 1/10)

The Advanced exended FAXENGINE Integrated Fax Controller (XFC -MV) includes following features.

1) **Microprocessor.**
   The embedded processor MC24 in XFC provides 16-Mbyte memory addressing capability over 24-bit address/8-bit data bus and dedicated control lines.

2) **Thermal Printer Control.**
   The interface consists of programmable data, latch, clock and 4 strobe signals. An internal A/D converter supports TPH temperature sensor interface.

3) **Scanner Control.**
   Six programmable control and timing signals supports CIS scanner interface. An internal 6-bit flash A/D converter is provided. Video processing performs shading correction pixel by pixel for non-uniformity in CIS sensors. Edge enhancement and dynamic contrast control (auto background control, contrast control, MTF) are also performed.

4) **Motor Control.**
   Eight outputs are provided to external current drivers; four for scanner motor and four for printer motor.

5) **Image Coding Schemes.**
   XFC provides MH and MR data compression and decompression conformed with ITU-T recommendation T.4.

6) **Real Time Clock (RTC).**
   XFC includes a battery backed-up real time clock. The life of the RTC is 32 years, and leap year compensation is automatic.

7) **External Memory Support.**
   External ROM stores the program object code. External RAM is used by processor for shading correction and line buffer. DRAM controller supports refresh during battery operation. DRAM stores image and voice data.

8) **Modem Interface.**
   XFC runs at a clock derived from modem clock. XFC immediately handles interrupt request from modem in order to keep constant transmission flow.

9) **Panel Interface.**
   Four inputs, eight strobe outputs, and two control outputs support keys scan and LCD driver.

10) **Battery and Power.**
   XFC detects power failure and switches to battery backed-up mode.

Table 8.1.1-1 XFC **Pin Functions**

Pin Name	Pin No.	I/O	Input Type	Output Type	Pin Description (Note: Active low signals have an “n” pin name endlng.)
CPU Control Interface					
MIRQn	135	I	HU	--	Modem interrupt, active low. (Hysteresis In, Internal Pullup.)
SYSCLK	133	I	H	--	System clock. (Hysteresis In.)
TSTCLK	130	O	--	3XC	Test clock.
Bus Control Interface					
A[23:0]	[1:6][8:13] [15:20][22:27]	O	T	3XT	Address bus (24-bit)
D[7:0]	[136:139] [141:144]	I/O	T	3XT	Data bus (8-bit)
RDn	128	O	--	3XTT	Read strobe.
WRn	127	O	--	3XTT	Write strobe.
ROMCSn	120	O	--	2XT	ROM chip select.
CS1n	122	O	--	2XT	I/O chip select.
CS0n	57	O	--	2XTT	SRAM chip select. (Battery powered.)
MCSn	121	O	--	2XC	Modem chip select.
SYNC	126	O	--	2XC	Indicates CPU op code fetch cycle (active high).
REGDMA	124	O	--	3XC	Indicates REGSEL cycle and DMA cycle.
WATTn	125	O	--	3XC	Indicates current TSTCLK cycle is a wait state or a halt state.
RASn	113	O	--	3XTT	DRAM row address select. (Battery powered).
CAS[2:0]N	[110:112]	O	--	2XTT	DRAM column address select. (Battery powered.)
DWRn	109	O	--	3XTT	DRAM writ. (Battery powered.)
Prime Power Reset Logic and Test					
DEBUGn	129	I	HU	--	Ecternal non-maskable input (NMI).
RESETn	131	I/O	HU	2XO	XFC Rest.
TEST	58	I	C	--	Sets Test mode (battery powered).
Battery Power Control and Reset Logic					
XIN	59	I	OSC	--	Crystal oscillator input pin.
XOUT	60	O	--	OSC	Crystal oscillator output pin.
PWRDWNn	62	I	H	--	Indicates loss if prime power (results in NMI).
BATRSTn	61	I	H	--	Battery power reset input.
Scanner Interface					
START	101	O	--	2XS	Scanner shift gate control.
CLK1	100	o	--	2xs	Scanner clock.
CLK1n	99	O	--	2XS	Scanner clock-inverted.
CLK2	98	O	--	2XS	Scanner reset gate control (or clock for CIS scanner).
VIDCTL[1:0]	[97:96]	O	--	2XC	Control for video preprocessing circuits.
Printer Interface					
PCLK/DMAACK	29	O	--	3XC	Thermal Print Head (TPH) clock or external DMAACK.
PDAT	30	O	--	2Xp	Serial printing data (to TPH).
PLAT	31	o	--	3xp	TPH data latch.
STRB[3:0]	[33:36]	O	--	1XP	Strobe signals for the TPH.
STRBPOL/DMARQ	37	I	C	--	Sets strobe polarity, active high/low., or external DMAREQ.

Table 8.1.1-1 XFC **Pin Functions**

Pin Name	Pin No.	I/O	Input Type	Output Type	Pin Description (Note: Active low signals have an “n” pin name endlng.)
Operator Panel Interface					
OPO[7:0]	[38:40][42:44] [46:47]	O	--	2XL	Keyboard/LED strobe [7:0].
OPI[3:0]	[49:52]	I	HU	--	Keyboard retrun [3:0]. (Pullup, Hysteresis In.)
LEDCTL	55	O	--	4XC	Indicates outputs OPO[7:0] are for LEDs.
LCDCS	54	O	--	1XC	LCD chip select.
General Purpose I/O					
GPIO[7:0]/ VID[7:0]	[86:87][89:94]	I/O	H	2XC	Programmable:GPIO (8 lines) or video data bus.
GPIO[10:8]/ VDC[2:0]	[83:85]	I/O	H	2XC	Programmable: GPIO (3 lines) or video data control signals.
GPIO11/ BE/SERINP	82	I/O	H	1XC	Programmable: GPIO line, Bus Enable, derial data input (Autobaud).
GPIO12/ CS2n/SCLK	80	I/O	H	2XC	Programmable: GPIO line, I/O chip select or SCLK (SART).
GPIO13/ CS3n/TXD	79	I/O	H	2XC	Programmable: GPIO line, I/O chip select or TXD (SART).
GPIO14/ CS4n/RXD	78	I/O	H	2XC	Programmable: GPIO line, I/O chip select or RXD (SART).
GPIO15/CS5 n	77	I/O	H	2XC	Programmable: GPIO Line or I/O chip select.
GPIO16/IRQ8	76	I/O	H	1XC	Programmable: GPIO Line or active high interrupt.
GPIO17/IRQ5 n	75	I/O	H	1XC	Programmable: GPIO Line or active low interrupt.
GPIO18 /IRQ10n	74	I/O	H	1XC	Programmable: GPIO Line or active low interrupt.
GPIO19/RDY/ SEROUT	73	I/O	H	1XC	Programmable: GPIO Line Ready or Serial out (Autobaud).
Miscellaneous					
SM[3:0]/ GPO[7:4]	[103:106]	O	--	1XC	Programmable: scan motor control pins or GPO pins.
PM[3:0]/ GPO[3:0]	[115:118]	O	--	1XC	Programmable: print motor control pins or GPO pins.
TONE	119	O	--	1XC	Tone output signal.
Power. Reference Voltages. Ground					
-Verf	66	I	-VR	--	Negative Reference Voltage for Video A/D.
+Verf	68	I	+VR	--	Positive Reference Voltage for Video A/D.
ADGA	69		VADG		A/D Analog Ground.
ADVA	70		VADV		A/D Analog Power.
ADGD	72		VADG		A/D Digital Ground.
ADVD	71		VADV		A/D Digital Power.
VIN	67	I	VA	--	Analog Video A/D input.
THADI	65	I	TA	--	Analog Thermal A/D input.
VSS(12)	134,132,108, 95,88,64,56, 53,45,28,21,7				Digital Ground. Vssi: 134,95,64,53,28 Vsso: 132,108,88,56,45,21,7
CDD(8)	140,123,102, 81,48,41,32, 14				Digital Power. VDDi: 123,102,48,32, CDDo: 140,81,41,14
VDRAM	114				Battery power for DRAM refresh.
VBAT	63				Battery oiwer for RTC and SRAM.
No Connection					
NC	107				No connection.

Table 8.1.1-2 XFC Signal Characteristics

Input Type	**Description**	VIL (V max.)	VIH (V min.)	Hysteresis (V min.)	Pullup Resistance(K ohm)
C	CMOS input	0.3*VDD	0.7*VDD	-	-
H	Hysteresis	0.3*VDD	0.6*VDD	1.0	-
HU	Hysteresis/Pull up	0.3*VDD	0.6*VDD	1.0	35-150
T	TTL input	0.8	2.0	-	-
TU	TTL/Pull up	0.8	2.0	-	35-150
OSC	CMOS input	0.3*VDD	0.7*VDD	-	-
Absolute Input Range = -0.5 to VDD+0.5					

Input Type	**Description**	**Operating**		**Absolute**	
		(V min.)	**(V max.)**	**(V min.)**	**(V max.)**
TA	Thermal A/D input	0.2*VDD	0.8*VDD	-0.5	VDD+0.5
VA	Video A/D input	-VR	+VR	-0.5	VADV+0.5
+VR	Video A/D +Vref	0.8	3.3	-0.5	VADV+0.5
-VR	Video A/D -Vref	-0.2	2.0	-0.5	VADV+0.5
VADV	Video A/D power	VDD-0.1	VDD+0.1	-0.5	7.0
VADG	Video A/D ground	-0.1	0.1	-0.5	0.5
VDD	Digital power	4.5	5.25	-0.5	7.0
GND	Digital ground	0	0	0	0
VDRAM	Battery power for DRAM	2.25	5.25	-0.5	7.0
VBAT	Battery power	2.25	5.25	-0.5	7.0

Output Type	**Description**	**VOL (V max)**	**IOL (mA min)**	**VOH (V min)**	**IOH (mA min)**	**CL (pF max)**
1XC	CMOS output (1X)	0.4	1.6	VDD-1.5	1.6	50
1XP. 2XP	High capacitance driver	0.4	1.6	VDD-1.5	1.6	200
2XC	CMOS output (2X)	0.4	3.5	VDD-1.5	3.5	50
2XT	TTL output (2X)	0.4	4	2.4	4	50
2XS	CMOS output (2X)	0.4	3.5	VDD-1.5 1.5	3.5 15	50 50
2XL	LED driver	0.7	10	VDD-1.5	3.5	100
2XO	CMOS output, Open drain	0.4	3.5	-	-	50
3XC	CMOS output (3X)	0.4	6	VDD-1.5	6	50
3XP	High capacitance driver (3X)	0.4	6	VDD-1.5	6	700
3XT	TTL output (3X)	0.4	6	2.4	6	50
4XC	CMOS Output (4X)	0.4	12	VDD-1.0	12	50
2XTT	2X Tristate TTL output	0.4	4	2.4	4	50
3XTT	3X Tristate TTL output	0.4	6	2.4	6	50

Table 8.1.1-3 XFC Memory Map

Chip select	Address (Hex)	External to XFC	Internal to XFC
CS0	000000-007FFF	SRAM	
	00E000-00FC00		Internal RAM
CS1	00FC00-00FDFF	I/O (N/C)	
	00FE00-00FEFF		Internal registers
MCS	00FF00-00FFFF	Modem	
CAS0	400000-4FFFFF	DRAM	
CAS1	500000-5FFFFF	DRAM	
ROMCS	FE0000-FFFFFF	ROM	

8.1.1.1 Bus Cycle Timing

The processor and external bus cycle timing is defined by **bclk** (an internal signal). **bclk** is referenced to **TSTCLK** which is derived by dividing **SYSCLK** by 2 as shown in Figure 8.1.1.1-1. **bclk** can be extended low (halted state) or stretched high (wait state) by external and internal conditions. Both halt and wait state are indicated on the external pin /WAIT.

A standard bus cycle begins at the falling edge of **TSTCLK** and ends at the falling edge of the next **TSTCLK.** Some memory and peripheral devices require extended bus cycle, which is added with wait states. Wait states can be created with programmable control for external chip selects (/ROMCS. /MCS, /CS[0:1]), and the DRAM controller (/CAS[0:2]).

The bus cycle can be halted by an access conflict (i.e., a CPU or DMA access to DRAM coincident with a DRAM refresh, or a CPU access to the RAM when a DMA access of the same RAM is in progress). When the bus cycle is stopped, halt states are added in increments of **TSTCLK**. When halt condition is released, the bus cycle resumes at the next **TSTCLK** rising edge.

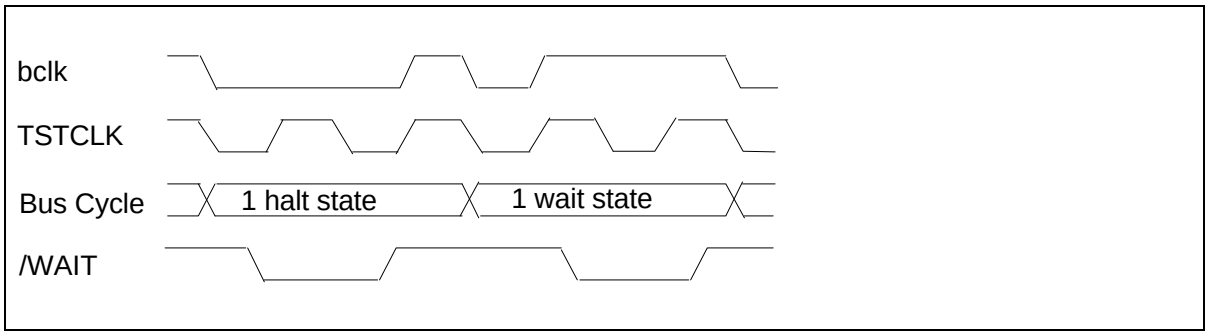


Figure 8.1.1-1 Bus Clock

8.1.1.2 External Bus Signal Timing

External bus clock and control timing is shown in Figure 8.1.1-2, while external bus data access timing is shown in Figure 8.1.1-3, and Table 8.1.1-4 provides the signal timing parameters for both of these figures.

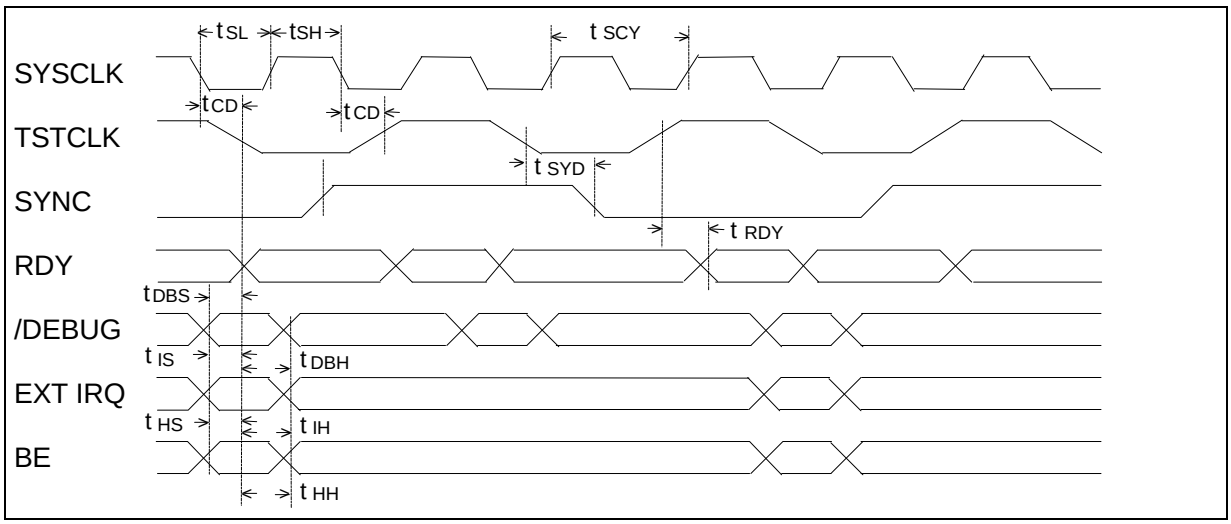


Figure 8.1.1-2

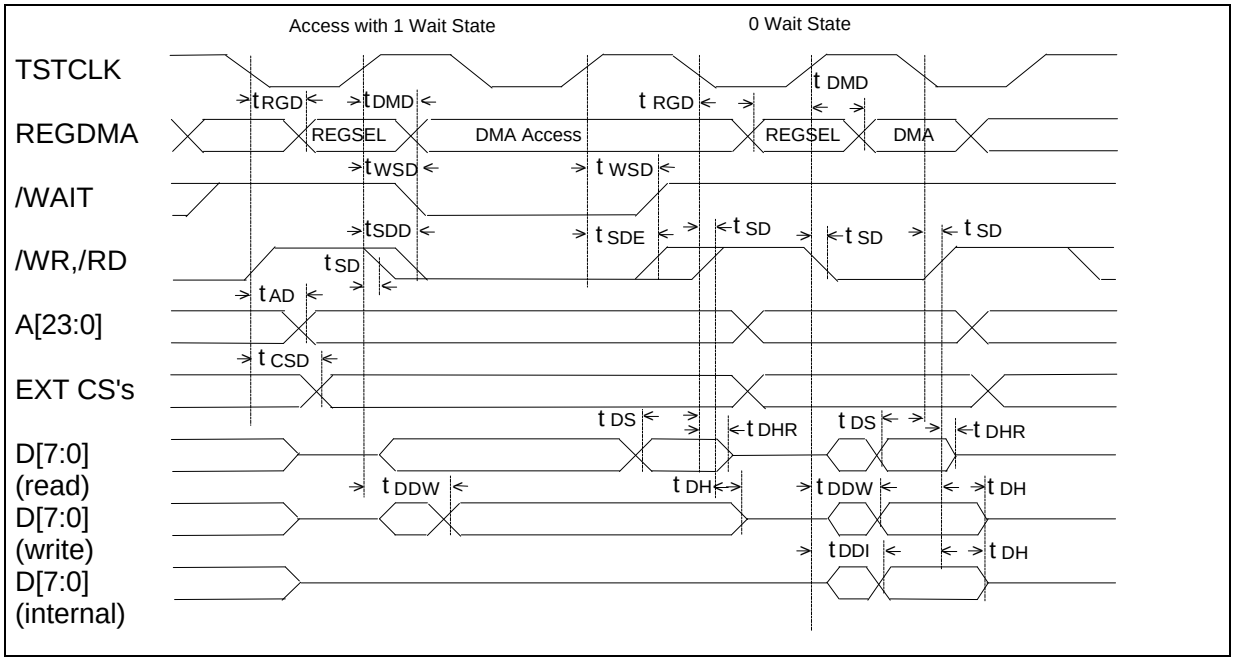


Figure 8.1.1-3

Table 8.1.1-4 External Bus Signal Timing Parameters

Parameter	Symbol	Min.	max.	Units
SYSCLK cycle	tSCY	50	-	ns
SYSCLK pulse width high	tSH	22	-	ns
SYSCLK pulse width low	tSL	22	-	ns
TSTCLK delay	tCD	-	20	ns
SYNC delay	tSYD*	-	30 tSL+10	ns
RDY access delay	tRDY	-	7	ns
/DEBUG setup	tDBS	20	-	ns
/DEBUG hold	tDBH	0	-	ns
Interrupts setup	tIS	15	-	ns

Table 8.1.1-4 External Bus Signal Timing Parameters

Interrupts hold	tIH	0	-	ns
BE setup	tHS	15	-	ns
BE hold	tHH	0	-	ns
REGDMA delay (CPU register access)	tRGD*	-	30 tSL+10	ns
REGDMA delay (DMA access)	tDMD*	-	30 tSL+10	ns
/WAIT delay	tWSD*	-	30 tSL+12	ns
/RD,/WR delay	tSD	-	5	ns
/RD,/WR delay (Delay On=1)	tSDD*	-	30 tSL+10	ns
/RD,/WR delay(Delay On=2,3)	tSDD	-	12	ns
/WR delay (Early Off)	tSDE*	-	30 tSL+10	ns
Address delay	tAD*	-	30 tSL+10	ns
Chip Select delay	tCSD*	-	30 tSL+12	ns
Data setup (Read)	tDS	12	-	ns
Data hold (Read)	tDHR	0	-	ns
Data delay (Write)	tDDW	-	20	ns
Data delay(Internal access)	tDDI	-	30	ns
Data hold (Write, Internal access)	tDH	tSL-10	-	ns

. Note : Valid value is whichever is the greater of the 2 values listed.
Test Conditions: 5.0V +5%/-10%, 70 . , 50pF on all pins.

8.1.1.3 DRAM Controller

The DRAM chip provided is 1 Mega by 4 bits with maximum access time 100ns. Up to 1 column chip selects, **/CAS0**, are supported to access total 1 Mega bytes. For basic memory of 1Mega bytes, 2 DRAM chips are provided, while for extended memory, 2 more chips are provided.
Address bus of DRAM are physically connected to address bit **A0** to **A9** of XFC. Row addresses are gated onto the DRAM address bus first, followed by column addresses. The following operation modes are supported: bytes access mode, early write mode and normal read mode. One wait state is inserted in each DRAM bus cycle.
DRAM refresh is performed automatically, but only **/CAS** before **/RAS** operation is supported. Refresh cycle time per 1024 cycles is 125ms. During power on when it is time to refresh DRAM and they are not being accessed, the refresh cycle starts. When power down, no DRAM access occur, and DRAM refresh continues on battery power.

8.1.1.4 CPU Interrupts

There are two ways to interrupt CPU, maskable interrupt (**/MIRQ**) and non-maskable interrupt NMI (**/DEBUG**,**/PWRDWN**). Modem interrupt **/MIRQ** must hold active until the CPU processes the request. The input **/PWRDWN** is OR'ed with the input **/DEBUG** and then
synchronized before NMI input. An active NMI signal branches program execution to the address stored in NMI vector. When NMI represents power down, indicated by **/PWRDWN** low, the NMI control firmware performs the necessary maintenance operation and then enable lockout register to protect battery backed-up registers during power down.

8.1.1.5 RESET logic and Watchdog Timer

There are two power resets, battery power reset (**/BATRST**) and prime power reset (**/PWRDWN**). The battery power reset initializes battery backed-up logic when battery is first applied or changed. Prime power reset initializes all non-battery powered logic when system power is turned on. Another reset is generated by watchdog timer which guards against firmware lockup. **/RESET** pin provides a reset signal to external devices when power down or watchdog reset is active. If /BATRST become low, D2 ON, so that U2C Op output low and reset modem.

8.1.1.6 Real Time Clock

The Real Time Clock (RTC) circuit is required to maintain current time information under primary power and battery backup conditions. RTC tracks seconds, minutes, hours, days, months and years elapsed since the reference year, 1992. The tracking range of RTC is up to 32 years, and automatic compensation is made for leap years.

8.1.2 Printer Controller (Sheet 2/10)

The primary power supply provides DC power of +5V, +12V, -12V and +24V. An active high of **POFF** signal turns on +24V supply of thermal printer. The three signals **PDAT**, **PLCK** and **PLAT** control the transfer of data to the printer. Voltage of a thermistor in thermal printer is monitored via **THADI** pin, and the equivalent temperature is detected by XFC. Four strobes to printer are shifted in sequence and the strobe on time is dependent on the temperature of printer. Therefore, optical density of printed copy can keep constant quality.

8.1.3 Scanner Controller (Sheet 3/10)

Two types of scanner can be applied, Mitsubishi and Lisvie. Power of scanner LED is on/off controlled by transistor switch Q1 and Q2. **CLK2** is 500KHz clock to scanner and **START** is periodic pulse for every 10ms. The scanner outputs video signal synchronized to clock. A flash A/D converter in XFC samples the video signal. XFC performs shading correction to correct scanner data for non-uniformity of 1728 image sensors. State of art image processing on both text and halftone images are provided. Edge enhancement improves image quality on halftone, and dynamic contrast control improves text image. An internal dither table programmable up to 8X8 byte matrix is provided to perform halftone process.
The video signal is amplified by adaptive gain in order to let white video level close to reference level of flash A/D converter.

8.1.4 Motor Drivers (Sheet 4/10)

Signal **SM[0..3]** and **PM[0..3]** are selected as scanner and printer motor control lines. The stepping pattern signals determined by firmware outputs to scanner and printer motors via current drivers, transistor array.

8.1.5 Switch and Sensors (Sheet 5/10)

Cover on/off switch is debounced by a RC couple. ADF sensor output is shunt by a noise-filtering capacitor. The outputs of two paper sensors are compared with reference level by voltage comparator.

8.1.6 Battery and Power Down Reset (Sheet 6/10)

Prime power failure is detected by a voltage comparator that compares +5V supply with a constant reference voltage 4.5V provided by transistor voltage source. Capacitor C35 is charged to 4.5V when power on, and hold a while to be reference level when power down.

Battery BT1 backs up XFC, SRAM and DRAM in the beginning of power down, and BT2 will take over to back up XFC and SRAM when BT1 discharges to lower level than BT2. DRAM needs more standby power and higher voltage than XFC and SRAM. Therefore, voice and image stored in DRAM can be retained for nice hours while the RTC date and user data can keep for three days.

8.1.7 Fax Modem and Audio Circuit (Sheet 7/10)

Modem chip RF144EFXL features an advanced Rockwell proprietary voice compression algorithm. This algorithm can compress voice to 5.7 kbps with near toll quality playback. DTMF and tone detection are available during voice codec operation. Echo cancellation techniques are employed during playback to allow DTMF and tone detection. The pin assignments for 100-pin PQFP are listed in table 8.1.7-1, and its digital interface characteristics is listed in table 8.1.7-2, analog interface is listed in table 8.1.7-3.

Table 8.1.7-1 Modem RF144EFXL Pin Functions

Pin No.	Pin Name	Signal Name	I/O	Description	Input Type	Output Type
1	GP03	Rrelay 1	O	General purpose input/output	IB	OB
2	GP04	Rrelay 2	O	General purpose input/output	IB	OB
3	GP05	Rrelay 3	O	General purpose input/output	IB	OB
4	GP06			General purpose input/output	IB	OB
5	GP07			General purpose input/output	IB	OB
6	OVD2			Connect to digital ground		
7	OVD2			Connect to digital ground		
8	D7	D7	I/O	Data bus line 7	IA	OB
9	D6	D6	I/O	Data bus line 6	IA	OB
10	D5	D5	I/O	Data bus line 5	IA	OB
11	D4	D4	I/O	Data bus line 4	IA	OB
12	D3	D3	I/O	Data bus line 3	IA	OB
13	D2	D2	I/O	Data bus line 2	IA	OB
14	D1	D1	I/O	Data bus line 1	IA	OB
15	D0	D0	I/O	Data bus line 0	IA	OB
16	OVD2			Connect to digital ground		
17	OVA			Connect to analog ov ground		
18	RAMPIN		I	Receiver amplifier input		
19	NC			No connection		
20	NC			No connection		
21	OVA			Connect to analogy ov groung		
22	+5VD2			Connect to digital +5V power		

Table 8.1.7-1 Modem RF144EFXL Pin Functions

Pin No.	Pin Name	Signal Name	I/O	Description	Input Type	Output Type
23	OVD1			Connect to digital ground		
24	SWGAINI			Connect to SWGAINO		
25	ECLKIN1			Connect to SWGAINI		
26	SYNCIN1			Connect to EYESYNC		
27	NC			No connection		
28	NC			No connection		
29	NC			No connection		
30	OVA			Connect to analogy ov ground		
31	NC			No connection		
32	NC			No connection		
33	NC			No connection		
34	DAIN			Connect to daout		
35	ADOUT			ADC output		
36	BYPASS	GP13		Receiver highpass filter bypass enable	IC	
37	RCVE			Connect to RCVO		
38	TXLOSS3			8dB of analog transmit level attenutation	IC	
39	TXLOSS2			4dB of analog transmit level attenutation	IC	
40	TXLOSS1			2dB of analog transmit level attenutation	IC	
41	NC			No connection		
42	NC			No connection		
43	OVA			Connect to analog ov graund		
44	TXOUT		O	Connect to smoothing filter input		
45	RXIN		I	Connect to anti-aliasinf filter output		
46	+5VA			Connect to analog +5V power		
47	OVA			Connect to analog ov ground		
48	AGD			+2.5 analog ground		
49	AOUT		O	Smoothing filter output		
50	OVD1			Connect to digital ground		
51	NC			No connection		
52	/IRQ1	/MIRQ	O	Interrupt request	IA	
53	/WRITE	/WR	I	Write enable	IA	
54	/CS	/MCS	I	Chip select	IA	
55	/READ	/RD	I	Read enable		
56	RS4	A4	I	Register select 4	IA	
57	RS3	A3	I	Register select 3	IA	
58	RS2	A2	I	Register select 2	IA	
59	RS1	A1	I	Register select 1	IA	
60	RS0	A0	I	Register select 0		
61	GP13	BYPASS		General purpose I/O	IB	OB
62	+5VD1			Connect to digital +5V power		
63	GP11	MUTE	O	General purpose input/output	IB	OB
64	/RTS			Request to send	IA	
65	/EN85			Enable 8085 bus	IA	

Table 8.1.7-1 Modem RF144EFXL Pin Functions

Pin No.	Pin Name	Signal Name	I/O	Description	Input Type	Output Type
66	OVD2			Connect to digital ground		
67	/PORI	/MRST	I	Power-on-reset input	ID	
68	XTLI			Connect to Crystal/Oscillator		
69	XTLO			Connect to Crystal/Oscillator		
70	XCLK	SYSCLK	O	19MHz output		OD
71	YCLK			9.5MHz output		OD
72	+5VD1			Connect to digital +5V power		
73	/IRQ2	DCLK	O	Interrupt request		OC
74	G2XCLK	SYNCIN1	O	Group 2 external transmit and receive data clock	IA	
75	GP16	/HOOK	I	General purpose input	IB	
76	GP17			General purpose input	IB	
77	OVD2			Connect to digital ground		
78	/CTS			Clear to send		
79	TXD			Transmit data	IA	
80	OVD2			Connect to digital ground		
81	OVD2			Connect to digital ground		
82	DCLK	/IRQ2		Transmit and receive data clock		OA
83	EYESYNC			Serial eye pattern strobe (9600Hz)		OA
84	EYECLKX			Serial eye pattern clock		
85	EYECLK			Serial eye pattern clock		OA
86	EYEX			Serial eye pattern X output		OA
87	ADIN			Connect to ADOUT		
88	DAOUT			DAC/AGC output		
89	OVD2			Connect to digital ground		
90	EYEY			Serial eye pattern Y output		OA
91	GP21			General purpose input	IB	
92	OVD2			Connect to digital ground		
93	GP20			General purpose input	IB	
94	GP19		I	General purpose input	IB	
95	RXD			Received data		OA
96	/RLSD			Received line signal detected		OA
97	OVD2			Connect to digital ground		
98	RCV0			Mode select output		
99	SWGAINO			Connect to SWGAINI		
100	GP02	RELAY	O	General purpose input/output	IB	OB

Notes:

I/O types:

IA,IB,IC,ID= Digital input.

OA,OB,OC,OD= Digital output.

I(DA)= Analog input.

O(DD), O(DF)= Analog output.

Table 8.1.7-2 Digital Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Condition
Input High Voltage	VIH				V	
Types IA and IB		2.0	-	Vcc		
Types IC and ID		0.8*Vcc	-	Vcc		
Input High Current	IIH				. A	Vcc=5.25V, Vin=5.25V
Type IB		-	-	40		
Type IC		-	-	2.5		
Input Low Voltage	VIL				V	
Type IA, IB, ID		-0.3	-	0.8		
Type IC		-0.3	-	0.2*Vcc		
Input Low Current	IIL				. A	Vcc= 5.25V
Types IB and IC		-	-	-400		
Input Leakage Current	IIN				. A	VIN= 0 to +5V
Type IB		-	-	ñ 2.5		Vcc= 5.25V
Output High Voltage	VOH				V	
Type OA and OB		3.5	-	-		ILOAD= -100.A
Type OD			-	Vcc		ILOAD= 0 mA
Output Low Voltage	VOL				V	
Types OA and OC		-	-	0.4		ILOAD= 1.6 mA
Types OB		-	-	0.4		ILOAD= 0.8 mA
Types OD		-	-	0.75		ILOAD= 15 mA
Output Leakage Current	ILO				. A	VIN= 0.4 to Vcc-1
Type OA and OB		-	-	ñ 10		
Capacitor Load	CL				pF	
Type IA and ID		-	10	-		
Type IB		-	20	-		
Capacitor Drive	CD				pF	
Type OA, OB, OC		-	100	-		
Circuit Type						
Type IA						TTL
Type IB						TTL with pull-up
Type IC						CMOS with pull-up
Type ID						POR
Type OA and OB						TTL with 3-state
Type OC						Open drain
Type OD						Relay driver

The crystal X1 for modem RFRF144EFXL is three overtone and needs inductor L12 and C109 for resonation at third harmonic 38.00053MHz. The analog power and ground are decoupled from +5V and digital ground by bead cores. Power-on reset **/MRST** is provided by XFC. Output of received analog signal is available on pin **VOICE** and is multiplexed with signal **TONE** before input to audio amplifier U18B. TXA, RXA, U18B, U18C, U18D is used to adject the volume of voice. RXA have to be amplified and modified voltage level according to this signal is different from modem characteristics..

8.1.8 Memory (Sheet 8/10)

There are 2 chips of 4 Mega bits DRAM mounted on board. SRAM of 32K bytes stores user and system data. DRAM is backed up by only battery BT1, SRAM is backed up by both BT1 and BT2. EPROM of 128K bits is installed on socket for various firmware versions are provided.

8.1.9 Network Interface (Sheet 9/10)

There are 4 relay drivers implemented by transistors. While power-on reset, control **REALY1** and **RELAY2** are high, **RELAY0** and **RELAY3** are low, and all relays are at normal state.

8.1.10 Panel Interface (Sheet 10/10)

Operation panel output bus **OPO[0..7]**, input bus **OPI[0..3]** and control output **LEDCTL**, **LCDCS** supports 32-keys keyboard and 3 LEDs. **LEDCTL** disables LEDs during keyboard strobing in order to prevent the dim LED glow. Also **OPO[0..3]** and **LCDCS** drive LCD module.

8.2 MOTHER BOARD CIRCUIT (OKIFAX 660)

The mother board version 7XFEMV05 is the first version that begins mass-production and the circuit diagrams consists of 11 schematics which are described in the following sections.

8.2.0 Block Diagram (sheet 0/11)

The extended FAXENGINE chip set consists of a Integrated Fax Controller (XFC-MV) and a modem chip (RFX144V24). The XFC provides built-in programmable hardware registers to control and monitor peripheral functions, such as scanner, printer, motors, cutter, power, modem, memory and operation panel. The modem chip includes an advanced voice compression algorithm which performs built-in digital answering machine.

8.2.1 Integrated Fax Controller (sheet 1/11)

The Advanced exended FAXENGINE Integrated Fax Controller (XFC -MV) includes following features.

2) **Microprocessor.**
The embedded processor MC24 in XFC provides 16-Mbyte memory addressing capability over 24-bit address/8-bit data bus and dedicated control lines.

3) **Thermal Printer Control.**
The interface consists of programmable data, latch, clock and 4 strobe signals. An internal A/D converter supports TPH temperature sensor interface.

4) **Scanner Control.**
Six programmable control and timing signals supports CIS scanner interface. An internal 6-bit flash A/D converter is provided. Video processing performs shading correction pixel by pixel for non-uniformity in CIS sensors. Edge enhancement and dynamic contrast control (auto background control, contrast control, MTF) are also performed.

5) **Motor Control.**
Eight outputs are provided to external current drivers; four for scanner motor and four for printer motor.

6) **Image Coding Schemes.**
XFC provides MH and MR data compression and decompression conformed with ITU-T recommendation T.4.

7) **Real Time Clock (RTC).**
XFC includes a battery backed-up real time clock. The life of the RTC is 32 years, and leap year compensation is automatic.

8) **External Memory Support.**
External ROM stores the program object code. External RAM is used by processor for shading correction and line buffer. DRAM controller supports refresh during battery operation. DRAM stores image and voice data.

9) **Modem Interface.**
XFC runs at a clock derived from modem clock. XFC immediately handles interrupt request from modem in order to keep constant transmission flow.

10) **Panel Interface.**
Four inputs, eight strobe outputs, and two control outputs support keys scan and LCD driver.

11) **Battery and Power.**
XFC detects power failure and switches to battery backed-up mode.

Table 8.2.1-1 XFC **Pin Functions**

Pin Name	Pin No.	I/O	Input Type	Output Type	Pin Description (Note: Active low signals have an "n" pin name endlng.)
CPU Control Interface					
MIRQn	135	I	HU	--	Modem interrupt, active low. (Hysteresis In, Internal Pullup.)
SYSCLK	133	I	H	--	System clock. (Hysteresis In.)
TSTCLK	130	O	--	3XC	Test clock.
Bus Control Interface					
A[23:0]	[1:6][8:13] [15:20][22:27]	O	T	3XT	Address bus (24-bit)
D[7:0]	[136:139] [141:144]	I/O	T	3XT	Data bus (8-bit)
RDn	128	o	--	3XTT	Read strobe.
WRn	127	O	--	3XTT	Write strobe.
ROMCSn	120	O	--	2XT	ROM chip select.
CS1n	122	O	--	2XT	I/O chip select.
CS0n	57	O	--	2XTT	SRAM chip select. (Battery powered.)
MCSn	121	O	--	2XC	Modem chip select.
SYNC	126	O	--	2XC	Indicates CPU op code fetch cycle (active high).
REGDMA	124	O	--	3XC	Indicates REGSEL cycle and DMA cycle.
WATTn	125	O	--	3XC	Indicates current TSTCLK cycle is a wait state or a halt state.
RASn	113	O	--	3XTT	DRAM row address select. (Battery powered).
CAS[2:0]N	[110:112]	O	--	2XTT	DRAM column address select. (Battery powered.)
DWRn	109	O	--	3XTT	DRAM writ. (Battery powered.)
Prime Power Reset Logic and Test					
DEBUGn	129	I	HU	--	Ecternal non-maskable input (NMI).
RESETn	131	I/O	HU	2XO	XFC Rest.
TEST	58	I	C	--	Sets Test mode (battery powered).
Battery Power Control and Reset Logic					
XIN	59	I	OSC	--	Crystal oscillator input pin.
xout	60	O	--	OSC	Crystal oscillator output pin.
PWRDWNn	62	I	H	--	Indicates loss if prime power (results in NMI).
BATRSTn	61	I	H	--	Battery power reset input.
Scanner Interface					
START	101	O	--	2XS	Scanner shift gate control.
CLK1	100	o	--	2xs	Scanner clock.
CLK1n	99	O	--	2XS	Scanner clock-inverted.
CLK2	98	O	--	2XS	Scanner reset gate control (or clock for CIS scanner).
VIDCTL[1:0]	[97:96]	O	--	2XC	Control for video preprocessing circuits.
Printer Interface					
PCLK/DMAACK	29	O	--	3XC	Thermal Print Head (TPH) clock or external DMAACK.
PDAT	30	O	--	2Xp	Serial printing data (to TPH).
PLAT	31	o	--	3xp	TPH data latch.
STRB[3:0]	[33:36]	O	--	1XP	Strobe signals for the TPH.
STRBPOL/DMARQ	37	I	C	--	Sets strobe polarity, active high/low., or external DMAREQ.

Table 8.2.1-1 XFC **Pin Functions**

Pin Name	Pin No.	I/O	Input Type	Output Type	Pin Description (Note: Active low signals have an “n” pin name endlng.)
Operator Panel Interface					
OPO[7:0]	[38:40][42:44] [46:47]	O	--	2XL	Keyboard/LED strobe [7:0].
OPI[3:0]	[49:52]	I	HU	--	Keyboard retrun [3:0]. (Pullup, Hysteresis In.)
LEDCTL	55	O	--	4XC	Indicates outputs OPO[7:0] are for LEDs.
LCDCS	54	O	--	1XC	LCD chip select.
General Purpose I/O					
GPIO[7:0]/ VID[7:0]	[86:87][89:94]	I/O	H	2XC	Programmable:GPIO (8 lines) or video data bus.
GPIO[10:8]/ VDC[2:0]	[83:85]	I/O	H	2XC	Programmable: GPIO (3 lines) or video data control signals.
GPIO11/ BE/SERINP	82	I/O	H	1XC	Programmable: GPIO line, Bus Enable, derial data input (Autobaud).
GPIO12/ CS2n/SCLK	80	I/O	H	2XC	Programmable: GPIO line, I/O chip select or SCLK (SART).
GPIO13/ CS3n/TXD	79	I/O	H	2XC	Programmable: GPIO line, I/O chip select or TXD (SART).
GPIO14/ CS4n/RXD	78	I/O	H	2XC	Programmable: GPIO line, I/O chip select or RXD (SART).
GPIO15/CS5 n	77	I/O	H	2XC	Programmable: GPIO Line or I/O chip select.
GPIO16/IRQ8	76	I/O	H	1XC	Programmable: GPIO Line or active high interrupt.
GPIO17/IRQ5 n	75	I/O	H	1XC	Programmable: GPIO Line or active low interrupt.
GPIO18 /IRQ10n	74	I/O	H	1XC	Programmable: GPIO Line or active low interrupt.
GPIO19/RDY/ SEROUT	73	I/O	H	1XC	Programmable: GPIO Line Ready or Serial out (Autobaud).
Miscellaneous					
SM[3:0]/ GPO[7:4]	[103:106]	O	--	1XC	Programmable: scan motor control pins or GPO pins.
PM[3:0]/ GPO[3:0]	[115:118]	O	--	1XC	Programmable: print motor control pins or GPO pins.
TONE	119	O	--	1XC	Tone output signal.
Power. Reference Voltages. Ground					
-Verf	66	I	-VR	--	Negative Reference Voltage for Video A/D.
+Verf	68	I	+VR	--	Positive Reference Voltage for Video A/D.
ADGA	69		VADG		A/D Analog Ground.
ADVA	70		VADV		A/D Analog Power.
ADGD	72		VADG		A/D Digital Ground.
ADVD	71		VADV		A/D Digital Power.
VIN	67	I	VA	--	Analog Video A/D input.
THADI	65	I	TA	--	Analog Thermal A/D input.
VSS(12)	134,132,108, 95,88,64,56,5 3,45,28,21,7				Digital Ground. Vssi: 134,95,64,53,28 Vsso: 132,108,88,56,45,21,7
CDD(8)	140,123,102, 81,48,41,32,1 4				Digital Power. VDDi: 123,102,48,32, CDDo: 140,81,41,14
VDRAM	114				Battery power for DRAM refresh.
VBAT	63				Battery oiwer for RTC and SRAM.
No Connection					
NC	107				No connection.

Table 8.2.1-2 XFC **Signal Characteristic**

Input Signal Characteristics						
Input Type	**Description**	**VIL (V max)**	**VIH (V min)**	**Hysteresis (V min)**	**Pullup Resistance (K ohm)**	
C	CMOS Input	0.3*VDD	0.7*VDD	-	-	
H	Hysteresis	0.3*VDD	0.6*VDD	1.0	-	
HU	Hydteresis/Pullup	0.3*VDD	0.6*VDD	1.0	35-150	
T	TTL Input	0.8	2.0	-	-	
TU	TTL/Pullup	0.8	2.0	-	35-150	
OSC	CMOS Input	0.3*VDD	0.7*VDD	-	-	
Absolute Input Range=0.5 to VDD+0.5						
Input Type	**Description**	**Operating (V min)**	**Operating (V max)**	**Abs. Max. (V min)**	**Abs. Max. (V max)**	
TA	Thermal Head Analog Input	0.2*VDD	0.8*VDD	-0.5	VDD+0.5	
VA	Video Analog In	-VR	+VR	-0.5	VADV+0.5	
+VR	Video A/D +Vref	0.8	3.3	-0.5	VADV+0.5	
-VR	Video A/D-Vref	-0.2	2.0	-0.5	VASV+0.5	
VADV	Video A/D Power	VDD-0.1	VDD+0.1	-0.5	7.0	
VADG	Video A/D GND	-0.1	0.1	-0.5	0.5	
VDD	Digital Power	4.5	5.25	-0.5	7.0	
GND	Digital Ground	0	0	0	0	
VDRAM	Battery Power for DRAM	2.25	5.25	-0.5	7.0	
VBAT	Battery Power for RTC/SRAM	2.25	5.25	-0.5	7.0	
Output Signal Characteridtics						
Input Type	**Description**	**VOL (V max)**	**IOL (mA max)**	**VOH (V max)**	**IOH (mA max)**	**CL (pF max)**
1XC	CMOS Output (1x)	0.4	1.6	VDD-1.5	1.6	50
1XP.2XP	High Capacifance Driver	0.4	1.6	VDD-1.5	1.6	200
2XC	XMOS Output (2X)	0.4	3.5	VDD-1.5	3.5	50
2XT	TTL Output (2X)	0.4	4	2.4	4	50
2XS	CMOS Output (2X)	0.4	3.5	VDD-1.5 1.5	3.5 15	50 50
2XL	LED Driver	0.7	10	VDD-1.5	3.5	100
2XO	CMOS Output Open Drain	0.4	3.5	N/A	N/A	50
3XC	CMOS Output (3x)	0.4	6	VDD-1.5	6	50
3XP	High Capacitance Driver (3X)	0.4	6	VDD-1.2	6	700
3XT	TTL Output (3X)	0.4	6	2.4	6	50
4XT	CMOS Output (4X)	0.4	12	VDD-1.0	12	50
2XTT	2X Tristate TTL Output	0.4	4	2.4	4	50
3XTT	3X Tristate TTL Output	0.4	6	2.4	6	50

Table 8.2.1-3 XFC Memory Map

Chip select	Address (Hex)	External to XFC	Internal to XFC
CS0	000000-007FFF	SRAM	
	00E000-00FC00		Internal RAM
CS1	00FC00-00FDFF	I/O (N/C)	
	00FE00-00FEFF		Internal registers
MCS	00FF00-00FFFF	Modem	
CAS2	300000-3FFFFF	DRAM	
CAS0	400000-4FFFFF	DRAM	
CAS1	500000-5FFFFF	DRAM	
ROMCS	FE0000-FFFFFF	ROM	

8.2.1.1 Bus Cycle Timing

The processor and external bus cycle timing is defined by **bclk** (an internal signal). **bclk** is referenced to **TSTCLK** which is derived by dividing **SYSCLK** by 2 as shown in Figure 8.1.1.1-1. **bclk** can be extended low (halted state) or stretched high (wait state) by external and internal conditions. Both halt and wait state are indicated on the external pin /WAIT.

A standard bus cycle begins at the falling edge of **TSTCLK** and ends at the falling edge of the next **TSTCLK.** Some memory and peripheral devices require extended bus cycle, which is added with wait states. Wait states can be created with programmable control for external chip selects (/ROMCS. /MCS, /CS[0:1]), and the DRAM controller (/CAS[0:2]).

The bus cycle can be halted by an access conflict (i.e., a CPU or DMA access to DRAM coincident with a DRAM refresh, or a CPU access to the RAM when a DMA access of the same RAM is in progress). When the bus cycle is stopped, halt states are added in increments of **TSTCLK**. When halt condition is released, the bus cycle resumes at the next **TSTCLK** rising edge.

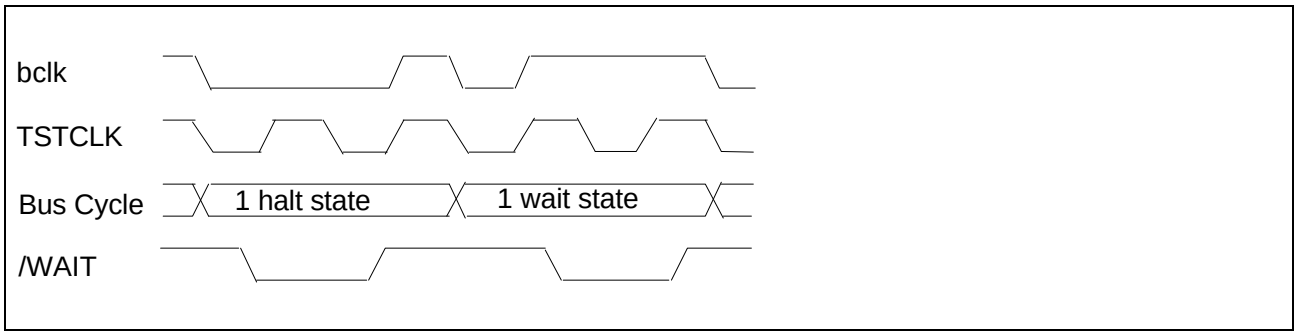


Figure 8.2.1-1 Bus Clock

8.2.1.2 External Bus Signal Timing

External bus clock and control timing is shown in Figure 8.1.1-2, while external bus data access timing is shown in Figure 8.1.1-3, and Table 8.1.1-4 provides the signal timing parameters for both of these figures.

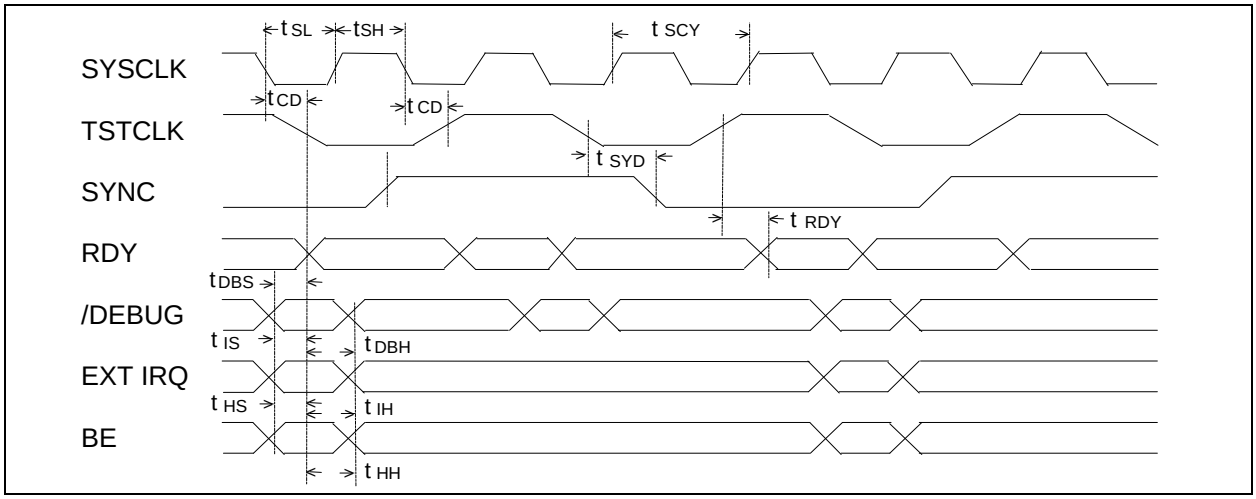


Figure 8.2.1-2

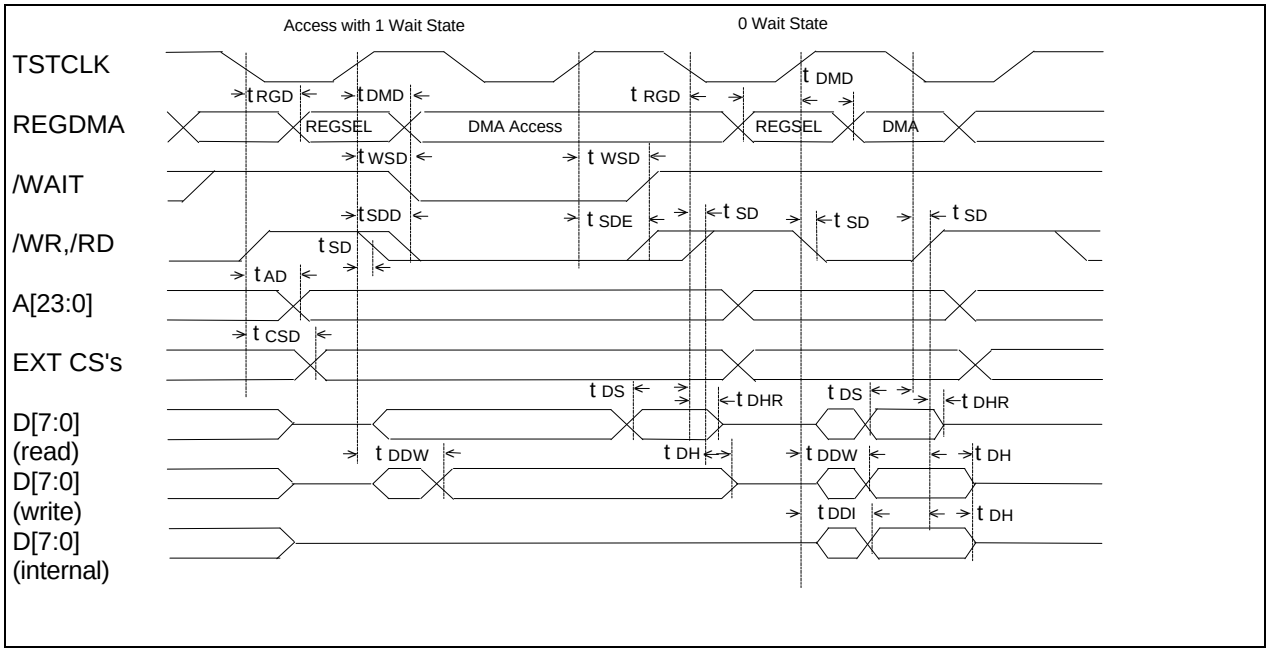


Figure 8.2.1-3

Table 8.2.1-4 External Bus Signal Timing Parameters

Parameter	Symbol	Min.	max.	Units
SYSCLK cycle	tSCY	50	-	ns
SYSCLK pulse width high	tSH	22	-	ns
SYSCLK pulse width low	tSL	22	-	ns
TSTCLK delay	tCD	-	20	ns
SYNC delay	tSYD*	-	30 tSL+10	ns
RDY access delay	tRDY	-	7	ns
/DEBUG setup	tDBS	20	-	ns
/DEBUG hold	tDBH	0	-	ns
Interrupts setup	tIS	15	-	ns
Interrupts hold	tIH	0	-	ns

Table 8.2.1-4 External Bus Signal Timing Parameters

BE setup	tHS	15	-	ns
BE hold	tHH	0	-	ns
REGDMA delay (CPU register access)	tRGD*	-	30 tSL+10	ns
REGDMA delay (DMA access)	tDMD*	-	30 tSL+10	ns
/WAIT delay	tWSD*	-	30 tSL+12	ns
/RD,/WR delay	tSD	-	5	ns
/RD,/WR delay (Delay On=1)	tSDD*	-	30 tSL+10	ns
/RD,/WR delay(Delay On=2,3)	tSDD	-	12	ns
/WR delay (Early Off)	tSDE*	-	30 tSL+10	ns
Address delay	tAD*	-	30 tSL+10	ns
Chip Select delay	tCSD*	-	30 tSL+12	ns
Data setup (Read)	tDS	12	-	ns
Data hold (Read)	tDHR	0	-	ns
Data delay (Write)	tDDW	-	20	ns
Data delay(Internal access)	tDDI	-	30	ns
Data hold (Write, Internal access)	tDH	tSL-10	-	ns

. Note : Valid value is whichever is the greater of the 2 values listed.
Test Conditions: 5.0V +5%/-10%, 70 . , 50pF on all pins.

8.2.1.3 DRAM Controller

The DRAM chip provided is 1 Mega by 4 bits with maximum access time 100ns. Up to 3 column chip selects, **/CAS0** to **/CAS2**, are supported to access total 2Mega bytes. For basic memory of 1 Mega bytes, 4 DRAM chips are provided, while for extended memory, 2 more chips are provided.

Address bus of DRAM are physically connected to address bit **A0** to **A9** of XFC. Row addresses are gated onto the DRAM address bus first, followed by column addresses. The following operation modes are supported: bytes access mode, early write mode and normal read mode. One wait state is inserted in each DRAM bus cycle.

DRAM refresh is performed automatically, but only **/CAS** before **/RAS** operation is supported. Refresh cycle time per 1024 cycles is 125ms. During power on when it is time to refresh DRAM and they are not being accessed, the refresh cycle starts. When power down, no DRAM access occur, and DRAM refresh continues on battery power.

8.2.1.4 CPU Interrupts

There are two ways to interrupt CPU, maskable interrupt (**/MIRQ**) and non-maskable interrupt NMI (**/DEBUG**,**/PWRDWN**). Modem interrupt **/MIRQ** must hold active until the CPU processes the request. The input **/PWRDWN** is OR'ed with the input **/DEBUG** and then
synchronized before NMI input. An active NMI signal branches program execution to the address stored in NMI vector. When NMI represents power down, indicated by **/PWRDWN** low, the NMI control firmware performs the necessary maintenance operation and then enable lockout register to protect battery backed-up registers during power down.

8.2.1.5 RESET Logic and Watchdog Timer

There are two power resets, battery power reset (**/BATRST**) and prime power reset (**/PWRDWN**). The battery power reset initializes battery backed-up logic when battery is first applied or changed. Prime power reset initializes all non-battery powered logic when system power is turned on. Another reset is generated by watchdog timer which guards against firmware lockup. **/RESET** pin provides a reset signal to external devices when power down or watchdog reset is active. If /BATRST become low, D2 ON, so that U2C OP output low and reset modem.

8.2.1.6 Real Time Clock

The Real Time Clock (RTC) circuit is required to maintain current time information under primary power and battery backup conditions. RTC tracks seconds, minutes, hours, days, months and years elapsed since the reference year, 1992. The tracking range of RTC is up to 32 years, and automatic compensation is made for leap years.

8.2.2 Printer Controller (Sheet 2/11)

The primary power supply provides DC power of +5V, +12V, -12V and +24V. An active high of **POFF** signal turns on +24V supply of thermal printer. The three signals **PDAT**, **PLCK** and **PLAT** control the transfer of data to the printer. Voltage of a thermistor in thermal printer is monitored via **THADI** pin, and the equivalent temperature is detected by XFC. Four strobes to printer are shifted in sequence and the strobe on time is dependent on the temperature of printer. Therefore, optical density of printed copy can keep constant quality.

8.2.3 Scanner Controller (Sheet 3/11)

Two types of scanner can be applied, Mitsubishi and Lisvie. Power of scanner LED is on/off controlled by transistor switch Q1 and Q2. **CLK2** is 500KHz clock to scanner and **START** is periodic pulse for every 10ms. The scanner outputs video signal synchronized to clock. A flash A/D converter in XFC samples the video signal. XFC performs shading correction to correct scanner data for non-uniformity of 1728 image sensors. State of art image processing on both text and halftone images are provided. Edge enhancement improves image quality on halftone, and dynamic contrast control improves text image. An internal dither table programmable up to 8X8 byte matrix is provided to perform halftone process.
The video signal is amplified by adaptive gain in order to let white video level close to reference level of flash A/D converter.

8.2.4 Motor Drivers (Sheet 4/11)

Signal **SM[0..3]** and **PM[0..3]** are selected as scanner and printer motor control lines. The stepping pattern signals determined by firmware outputs to scanner and printer motors via current drivers, transistor array.

8.2.5 Switch and Sensors (Sheet 5/11)

Cover on/off switch is debounced by a RC couple. ADF sensor output is shunt by a noise-filtering capacitor. The outputs of two paper sensors are compared with reference level by voltage comparator.

8.2.6 Battery and Power Down Reset (Sheet 6/11)

Prime power failure is detected by a voltage comparator that compares +5V supply with a constant reference voltage 4.5V provided by transistor voltage source. Capacitor C35 is charged to 4.5V when power on, and hold a while to be reference level when power down.

Battery BT1 backs up XFC, SRAM and DRAM in the beginning of power down, and BT2 will take over to back up XFC and SRAM when BT1 discharges to lower level than BT2. DRAM needs more standby power and higher voltage than XFC and SRAM. Therefore, voice and image stored in DRAM can be retained for nice hours while the RTC date and user data can keep for three days.

8.2.7 Fax Modem and Audio Circuit (Sheet 7/11)

Modem chip RFX144V24 features an advanced Rockwell proprietary voice compression algorithm. This algorithm can compress voice to 5.7 kbps with near toll quality playback. DTMF and tone detection are available during voice codec operation. Echo cancellation techniques are employed during playback to allow DTMF and tone detection. The pin assignments for 100-pin PQFP are listed in table 8.1.7-1, and its digital interface characteristics is listed in table 8.1.7-2, analog interface is listed in table 8.1.7-3.

Table 8.2.7-1 Modem RF144V24 Pin Functions

Pin No.	Signal Label	I/O Type	Interface	Pin No.	Signal Label	I/O Type	Interface
1	RS4	IA	Host Parallel Interface	23	TMODE	MI	MDP:RMODE (18)
2	RS3	IA	Host Parallel Interface	24	TXDAT	MI	MDP:SR4OUT (90)
3	RS2	IA	Host Parallel Interface	25	AVDD	PWR	VCC through power decoupling filter
4	RS1	IA	Host Parallel Interface	26	-TALK	OD	Line interface
5	RS0	IA	Host Parallel Interface	27	AGND1	GND	AGND
6	VDD1	PWR	VCC	28	TXA1	O(DD)	Analog Switch/Line Interface (TXA1)
7	D7	IA/OB	Host Parallel Interface	29	TXA2	O(DD)	Analog Switch/Line Interface (TXA2)
8	D6	IA/OB	Host Parallel Interface	30	DGNDA2	GND	AGND
9	D5	IA/OB	Host Parallel Interface	31	NC		
10	D4	IA/OB	Host Parallel Interface	32	NC		
11	D3	IA/OB	Host Parallel Interface	33	NC		
12	D2	IA/OB	Host Parallel Interface	34	NC		
13	D1	IA/OB	Host Parallel Interface	35	VAA1	PWR	VCC through power decoupling filter
14	D0	IA/OB	Host Parallel Interface	36	-SLEEP	MI	MDP:GPO0 (71); XIA:PD (21)
15	-WRITE	IA	Host Parallel Interface	37	AGND2	GND	AGND
16	DGND1	GND	DGND	38	RIN	I(DA)	Analog Switch/Line Interface (RIN)
17	RXOUT	MI	MDP:SR3IN (79)	39	VC	MI	AGND through capacitors
18	RMODE	MI	MDP:TMODE (23) & SR1IO (88); XIA: RMODE (7)	40	VREF	MI	VC through capacitors
19	TSTROBE	MI	MDP:IA1CLK (86)	41	NC		
20	TRESET	MI	MDP: SA1CLK	42	NC		
21	DGNDA1	GND	AGND	43	DGNDA3	GND	AGND
22	N/C			44	SPKR	O(DF)	Analog Switch/Speaker Circuit (SPKR)

Table 8.2.7-1 Modem RF144V24 Pin Functions

Pin No.	Signal Label	I/O Type	Interface	Pin No.	Signal Label	I/O Type	Interface
45	VAA2	PWR	VCC through power decoupling filter	73	XTLI	I	Crystal/Clock Circuit
46	-OH	OD	Line Interface	74	XTLO	O	Crystal/Clock Circuit
47	-POR	MI	MDP:-RESET (72); XIA:-POR (3)	75	XCLK	OD	Diagnostic Circuit
48	CLKIN	MI	MDP:IACLK (50)	76	YCLK	OD	Diagnostic Circuit
49	NC			77	VDD3	PWR	VCC
50	IACLK	MI	MDP:CLKIN (48); CIA:CLKIN (4)	78	-IRQ2	OC	Host Parallel Interface
51	NC			79	SR3IN	MI	MDP:RXOUT (17)
52	-CS	IA	Host Parallel Interface	80	DGND3	GND	DGND
53	-READ	IA	Host Parallel Interface	81	DGND4	GND	DGND
54	GPI2	IA	General Purpose Input	82	SR4IN	MI	XIA:RXDAT (6)
55	GPI3	IA	General Purpose Input	83	SR3OUT	MI	XIA:TXDAT (13)
56	GPI4	IA	General Purpose Input	84	EYESYNC	OA	Eye Pattem Circuit
57	GPI5	IA	General Purpose Input	85	EYECLK	OA	Eye Pattem Circuit
58	VDD2	PWR	VCC	86	IA1CLK	MI	MDP:TSTROBE (19)
59	GPI6	IA	General Purpose Input	87	SA1CLK	MI	MDP:TRESET (20)
60	GPI7	IA	General Purpose Input/Line Interface	88	SR1IO	MI	MDP:TMODE (23) & RMODE (18)
61	GPO7	OB	General Purpose Output	89	EYEXY	OA	Eye Pattem Circuit
62	GPO6	OB	General Purpose Output	90	SR4OUT	MI	MDP: TCDAT (24)
63	GPO5	OB	General Purpose Output	91	NC		
64	GPO4	OB	General Purpose Output	92	-RLSD	OA	DET Serial Interface
65	GPO3	OB	General Purpose Output	93	DCLK	OA	DTE Serial Interface
66	DGND2	GND	DGND	94	-EN85	IA	Auxiliary Circuit
67	-CTS	OA	DTE Serial Interface	95	GPI0	IA	General Purpose Input
68	-IRQ1	DC	Host Parallel Interface	96	-RTS	IA	DTE Serial Interface
69	GPO2	OB	General Purpose Output	97	DGND5	GND	DGND
70	GPO1	OB	General Purpose Output	98	GPI1	IA	General Purpose Input
71	GPO0	OB	MDP:-SLEEP (36)	99	TXD	IA	DTE Serial Interface
72	-RESET	OA	Reset Circuit	100	RXD	OA	DTE Serial Interface

Notes:

I/O types:

MI= Modem interconnect.
IA,IB,IC,ID= Digital input.
OA,OB,OC,OD= Digital output.
I(DA)= Analog input.
O(DD), O(DF)= Analog output.

NC=No external connection allowed.

Table 8.2.7-2 Digital Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Units	Test Condition
Input High Voltage	V_{IH}				VDC	
Types IA and IB		2.0	-	V_{CC}		
Types IC and ID		0.8 V_{CC}	-	V_{CC}		
Input High Current	I_{IH}				.A	VCC=5.25V, V_{IN}=5.25V
Type IB		-	-	40		
Type IC		-	-	2.5		
Input Low Voltage	V_{IL}				VDC	
Type IA, IB, ID		-0.3	-	0.8		
Type IC		-0.3	-	0.2(VCC)		
Input Low Current	I_{IL}				.A	VCC= 5.25V
Types IB and IC		-	-	-400		
Input Leakage Current	I_{IN}				.ADC	V_{IN}= 0 to +5V,
Type IB		-	-	ñ 2.5		VCC= 5.25V
Output High Voltage	V_{OH}				VDC	
Type OA and OB		3.5	-	-		I_{LOAD}= -100.A
Type OD			-	Vcc		I_{LOAD}= 0 mA
Output Low Voltage	V_{OL}				.VDC	
Types OA and OC		-	-	0.4		I_{LOAD}= 1.6 mA
Types OB		-	-	0.4		I_{LOAD}= 0.8 mA
Types OD		-	-	0.75		I_{LOAD}= 15 mA
Output Leakage Current	I_{LO}				.ADC	V_{IN}= 0.4 to VCC-1
Type OA and OB		-	-	ñ 10		
Capacitor Load	C_L				pF	
Type IA and ID		-	-	10		
Type IB		-	-	20		
Capacitor Drive	C_D				pF	
Type OA, OB, OC		-	-	10		
Circuit Type						
Type IA						TTL
Type IB						TTL with pull-up
Type IC						CMOS with pull-up
Type ID						POR
Type OA and OB						TTL with 3-state
Type OC						Open drain
Type OD						Relay driver

Table 8.2.7-3 Analog Interface Characteristics

Name	Type	Characteristics	Value
MDP			
RIN	I(DA)	Input Impedance	> 70 Kê
		Maximum Input Voltage	1.7 VP-P
		Reference Vottage*	+2.5 VDC
TXA1, TXA2	O(DD)	Minimum Load	300ê
		Maximum Capacitive Load	0.01uF
		Output Impedance	10ê
		Maximum Output Voltage	1.2 VP-PV @9600Hz sample rate
			2.7 VP-P @8000Hz sample rate
		Reference Voltage*	+2.5 VDC
		DC Offset Voltage	ñ200mV

Table 8.2.7-3 Analog Interface Characteristics

Name	Type	Characteristics	Value
SPKR	O(DF)	Minimum Load	300ê
		Maximum Capacitive Load	0.01uF
		Output Impedance	10ê
		Maximum Output Voltage	2.0 VP-P
		Reference Voltage*	+2.5 VDC
		DC Offset Voltage	ñ20mV
XIA			
RIN (MICOUT)	I (DA)	Input Impedance	> 70 Kê
		Maximum AC Input Voltage	1.7 VP-P
		Reference Voltage*	+2.5VDC
TXA1 (SPLHI), TXA2 (SPKLO)	O (DD)	Minimum Load	300ê
		Maximum Capacltive Load	0.01uF
		Output Impedance	10ê
		Maximum AC Output Voltage	2.7 VP-P
		Reference Voltage*	+2.5VDC
		DC Offset Voltage	ñ200mV
*Reference Voltage provided internal to the devica.			

The crystal X1 for modem RFX144V24 is three overtone and needs inductor L8 and C45 for resonation at third harmonic 49.92MHz. The analog power and ground are decoupled from +5V and digital ground by bead cores. Power-on reset **/MRST** is provided by XFC. Output of received analog signal is available on pin **SPKR** and is multiplexed with signal **TONE** before input to audio amplifier U5. TXA2 is coupled to SPKFONT as transmitted signal. TXA, hence the echo cancellation is made by subtracting TXA1 for RXA.

8.2.8 Memory (Sheet 8/10)

There are 2 chips of 4 Mega bits DRAM mounted on board. SRAM of 32K bytes stores user and system data. DRAM is backed up by only battery BT1, SRAM is backed up by both BT1 and BT2. EPROM of 128K bits is installed on socket for various firmware versions are provided.

8.2.9 Network Interface (Sheet 9/11)

There are 4 relay drivers implemented by transistors. While power-on reset, control **REALY1** and **RELAY2** are high, **RELAY0** and **RELAY3** are low, and all relays are at normal state.

8.2.10 Panel Interface (Sheet 10/11)

Operation panel output bus **OPO[0..7]**, input bus **OPI[0..3]** and control output **LEDCTL**, **LCDCS** supports 32-keys keyboard and 3 LEDs. **LEDCTL** disables LEDs during keyboard strobing in order to prevent the dim LED glow. Also **OPO[0..3]** and **LCDCS** drive LCD module.

8.2.11 Speaker Phone (Sheet 11/11)

Speaker phone IC.U22 provides the necessary circuit to perform a voice switched, half duplex, speaker phone function as the “HAND-FREE” conversation. The IC includes transmit and receive attenuators, pre-amplifier, level detectors and background noise monitors. The voice control is provided with 3 level by signal VOL-OTRL [0..2] while the signal SPKFONE is used to power down/on the I.C. Transmited voice from microphone Via I.C. is coupled to TXA2 while output of received voice is multiplexed, with signal TONE as well as MDMSPK before input to audio amplifier U23.

8.3 KEY BOARD CIRCUIT

The keyboard consists of following parts:

(1) Dot Matrix LCD Module

It has character generator and data RAM on board which provide easy interface for host XFC. Its bus operation is 4-bit access.

(2) LED Drivers and LEDs

Three LEDs are driven by control **LEDCTL** via transistor Q1 and strobe by **OP05**, **OP06** and **OP07**.

(3) Key Switch Matrix

OP00 to **OP07** strobe each key matrix column in sequence, and **OPI0** to **OPI3** are read by XFC to determine which key is pressed.

(4) Document Sensor & ADF Sensor.

Detects any document fed in guide.

(5) Microphone (OKIFAX 660 only)

An Electric Condenser Microphone unit (ECM) supports audio sensitivity of -63dB.

8.4 NCU BOARD CIRCUIT DIAGRAM

8.4.1 NCU BOARD CIRCUIT DIAGRAM DESCRIPTION

(1) General Functions of this circuit are as follows:

(a) Support an interface for the exchange with a telephone exchange or network in phase A and E defined by ITU-T T.30.

. Dial tone detection

. Generation of dial pulse

. Busy tone detection

. Ring detection

(b) Sends various data and signals from main board to the line.

. Picture data/Protocol/tonal signals etc.

(c) Receives the following signals and data from the line to the main board.

. Picture data/Protocol/Tonal signals etc.

(2) Dialling Method:

There are two kinds of dialling method used in OKIFAX 610/660. Both of them can be used in the tone and pulse switching system.

(a) SW1 to choice tone or pulse mode. then CPU controls the signal and send

the phone number out.

<i> Choice the tone mode → CPU controls the TX mode and send the tone signal.

<ii> Choice the pulse mode →CPU controls the relay K1. then the speed of pulse is 10 pps. Make time is optional from 33 or 39 ms.

(3) Ring Detection:

The ringing signal detection circuit includes D6,ZD3,ZD4,R6,C3 and PH2.
The C6 is a DC blocked , PH7 is a AC/DC input photo coupler.

(i) The TAD/FAX Ring signal's path.

J1 → LP2 → JP9 (Or K5) → L1 → JP1 (Or LF2 //CF2) → K2 → J5 → C3

→ R6 → ZD3,ZD4 → PH2(or D6) → JP5 → L1 → JP10 (or K5) → LP1 →J1

When PH2 (Pin4) generates a " Low " signal , it indicates a valid ring detected.

(4) When Rx:

<i> If the machine is set at "Auto Receive" mode, and ring signal is detected by CPU, then after this time , it comes into FAX Loop.

. **FAX Loop (DC Loop) :**

J1 → LP2 → JP9 (Or K5) → L1 → JP1 (Or LF2//CF2) → K2 → K1 → R1

→ T1 → R3 → K2 → L1 → JP10 (Or K5) → LP1

Then the ring detector and auto receive function are finished.

<ii> If the machine is set at " TEL/FAX" or "TEL" (When the handset pick up) " mode , and the ring signal is detected, K3 keeps N.C., and K2 switches to N.O.. It forms a AC loop for CNG detection. If the CNG is detected, then K1 switches to N.O., it comes into FAX Loop (DC Loop).

.**AC Loop:**

J1(Pin2) → LP2 → JP9 (Or K5) → L1 → JP1 (Or LF2//CF2)→ K2 → R2 → C2 → R1 → T1 → R3 → K2 → L1 → JP10 (Or K5) → LP1 → J4(Pin1)

(5) When TX:

We use the key-pad to do the dial function. If you want to dial directly by using the key-pad, you have to insert the document first then dial numbers and then press **Copy/Start** key. Then it goes into phase A and send CNG, K1,K2 switches to N.O.. In this time, it comes into FAX Loop.

(6) Telephone Detection:

It includes PH7 (or K7) , J4 and handset.

<i> The PH7 (or K7) is a AC/DC input current detector. When we pick up the attach handset the loop current will drive PH7(or K7).in this time,PH7(or K7) will generate a "Low" signal as a handset detected signal..

<ii> When we pick up the built-in handset the J4 Pin1 and Pin2 will be shorted, PH7(or K7) will generate a "Low" signal as a handset detected signal.

When J2(pin4) become "low" signal it tells CPU the handset being picked up.

(7) TAM MEMO, OGM Record (For OKIFAX 660):

When record Memo or OGM, K5 switches to N.O., and power supply provid 24V (DC) from J3.

Record DC Loop:

J3 → R22 → K5(N.O.) → L1 → JP1(or CF1//LF1) → K3 → TEL. → K2 → K1 → R1

→ T1 → R3 → K2 → L1 → K5 → J3

8.5 TEL BOARD CIRCUIT DIAGRAM

8.5.1 Ringing Mode:

Ring signal path:

J1 → LP2 → JP9(or K5) →L1 →JP1(or CF1//LF1) → K2 → C6 → ZD9,ZD10 → R2 → DB1

→ J5(pin12) →J5(pin13) →C21//ZD7(piezo ringer supply) → C34//ZD8(VDD).

Another path exists from C6 and R39 to FCI//C24//R41 for the frequency detector input. R39 is not only for current limited function but also effect the specification of ring tap function. Ringing circuit will be connected to await ringing signal when HK is on hook condition.

Operation:

The ring signal is checked at pin FCI (21) for a valid ringing frequency. As soon as a signal is applied to the line the internal "ring frequency detector" will start provided that the signal level at FCI is above the trigger threshold (about 2/3 VDD). If the frequency is within the specified range the melody generator will send a bitstream out of MO (8) charging the piezo ringer via D12 and an internal high voltage transistor. As soon as a nonvalid or missing ring signal is detected the bitstream is stopped and the circuit returns to standby.

8.5.2 Dialing Mode:

Dialing circuit:

IC1.R25~30.R50~54.HS/DP (pin10).MODE (pin12).MFL (pin2) and Y1.C31.Q1-5.D13.D14.

Operation:

Y1.C31 constitute a oscillator circuit which will provide to IC1 for dialing element.
IC1-pin12 (MODE) is the switch of T/P. The switch T/P decides the function of DTMF/PULSE. The function list.

- Pin12 (MODE) connect to pin19 (R54) by T/P switch , IC1 will work on pulse dial (LD 10pps, 40/60 ms).
- Pin12 (MODE) connect to pin20 (R53,D14) by T/P switch , IC1 will work on
- pulse dial (LD 10pps , 33/66 ms , TEMP. MF with tone on first .key entry).
- Pin12 (MODE) connect to pin18(R52,D13) by T/P switch , IC1 will work on MF dial (MF only , 82/160 ms).

Tone dialing:

During TONE dialing the same line conditions as in speech mode apply, except that speech is muted in both directions and a confidence tone is send to the RX amplifier.
The TONE signal is modulated to the line by controlling the shunt transistor, Q7 during inter-digit pauses speech is also muted. TONE level is adjusted by a DC voltage at the pin2 (MFL) input.

Pulse dialing:

With pulse dialing, the line has to be interrupted during "Break" periods and short circuited during "Make" periods. For example "LD 60/40 10pps" mean.Break/Make ratio is 60:40 with 10 pulse per second = the dialing pulse is a 60ms break (line interrupt) followed by a 40ms make (line short circuit).
Dialing number "1" will result in one dialing pulse, total time = 100ms
Dialing number "0" will result in 10 dialing pulse, total time = 10*100ms = 1sec.
Line break pulse are performed by Q1.Q2 being switched off the on-off control signal is output from the pin10 (HS/DP) switch Q4 (and in turn Q1.Q2) on and off.
Make pulse are performed by Q7 with Q1.Q2 being switched on. The base of Q7 (= pin25, CS) is pulled to VSS , resulting in VLI = VBE ≈ 0.7V.
CS is pulled low during the complete dialing period of one digit , which means in worst case (dialing number "0") the circuit cannot be supplied from line and must be buffered by the VDD-cap, C34. Therefore C34 must be big enough to supply the active circuit for 1 second.

8.5.3 Hook Mode:

In on-hook state the circuit is supplied by a very small current to maintain retention of stored numbers and ringing melody. The hook transistor is off and the pin10 (HS) is forced to zero by R29 and R30//Q4BE. If the telephone is disconnected from line memories are not lost since C34 keeps charging VDD for a limited period of time. The absolute time span depends on the quality (internal discharge) of C34 and the leakage resistance of ZD8.

8.5.4 Speech Mode:

Speech circuit:

The speech circuit is consisted by R36-38.R41-45.C18-20.C22-23.C25-30.

Transmit:

(i) **microphone gain setting**: The electric handset microphone is supplied from the constant voltage at pin27 (LI) , filtered by R40 and C25.R42 and R43 are the bias resistors of the electric microphone. Transmit gain is set by both selecting the proper microphone type (sensitivity) and by varying R42 .R43.

(ii) **TX frequency shaping:**Transmit frequency shaping can be done by C27.C28 (high pass) and C29 (low pass). C26 is used for EMC filtering.
Pin23 (M1) and pin24 (M2) are differential input of the microphone amplifier. Please note the proper connection of the M1 and M2 inputs in respect to the positive and negative side of the microphone.

Receive:

(i) **Receive gain setting**: receive gain is set by both sensitivity of earpiece and the value of R44.R45.

(ii) **RX frequency shaping:** receive frequency shaping is done by C30 (high pass) at the RX amplifier output.

The receive signal is applied at the RX amplifier inputs , pin28 (RI) and pin6 (STB) and output single ended at pin3 (RO). RX gain can be controlled by the volume keys , but is always reset to default volume after off-hook.

Note.
If filtering of metering pulse (type. 12 or 16KHz) is required two blocking filters can be installed.

- LF1 , CF1 (NCU BOARD) as notch filter at the line input.
- LF2 , CF2 as notch filter at the RX amplifier input.

8.5.5 Trouble Shooting

1. No ring

1-1. Are there some polarization in D12.ZD7.ZD8.
1-2. Does any voltage input IC1 pin4.
1-3. Does any voltage output from IC1 pin8.
1-4. Are there some defective in piezo.
1-5. Does any voltage from R23 to ground.

2. Ringing abnormality

2-1. Are there polarization or leakage problem in C21.
2-2. Are there miss-insert or converted polarization ZD7.Q6.
2-3. Are there some miss-insert or deterioration in R31.R32.

3. Dialing problem

3-1. Are there any converted polarization in Q1.Q2.Q3.Q5.Q7.D13,D14 and ZD6 .
3-2. Are there key‘s bus good .
3-3. Are there some voltage in IC1 pin4.
3-4. Does any oscillation output from Y1.
3-5. Does any signal output from IC1 pin5.
3-6. Does any signal input IC1 pin2.
3-7. Does any signal input IC1 pin1.

4. Speech sending problem

4-1 is MIC fail?
4-2. Does any signal input IC1 pin23.
4-3. Is the voltage IC1 pin1 work normal.
4-4.Does any signal output from IC1 pin1.

5. Speech receiving problem

5-1. Is C30 and R42.R43 fail.
5-2. Does any signal input IC1 pin27.
5-3. Does IC1 pin3 output any signal.

8.6 POWER SUPPLY (TTF-2866-2) SPECIFICATION

8.6.1 Power Supply Unit

(1) Introductions

The Skynet Model TTF-2866-2 is a fanless switching mode power supply used for facsimile.

(2) Input Specifications

(a) Input voltage

The range of input voltage from 180VAC to 270VAC.

(b) Input frequency

The range of input frequency is from 47HZ to 63HZ.

(c) Input current

The input current is 1A at 230VAC.

(d) Inrush current

The inrush current will not exceed 30A at 230VAC input, cold start, 25°C.

(3) Output Specifications

(a) Load range

Output	min. load	max. load	peak load	accuracy range
+5V	0.12A	0.70A		4.9V to 5.1V
+12V	0 A	0.20A	0.4A	12.0V to 13.0V
-12V	0 A	0.10A		-12.0V to -13.0V
+24VA	0 A	1.60A	5.0A	22.8V to 25.2V
+24Viso (floating)	0 A	30mA	50mA	20.4V to 27.6V
+5Viso (floating)	0 A	0.3A	0.4A(50ms)	4.75V to 5.25V

At factory the +5V output is set from 4.9V to 5.1V at max. load, and the accuracy of other outputs are checked to be within the specified accuracy range. +24 V peak load duration 10ms, duty 0.7, last for 1 min. at 25..

(b) Ripple and noise

The peak to peak ripple and noise for +5V(+5V Ovise) output is less than 50mV, for ñ12V outputs are less than 50mV, for +24VA outputs are less than 150mV,for +24Viso output are less than 2.40mV. Measuring is done by 15 MHz band width Limited oscilloscope and terminated each output with a 0.47uF capacitor at max. load.

(c) Line regulation

The line regulation for all outputs are less than ñ 1% while measuring at max. load and ñ 10% of input voltage changing.

(d) Load regulation

The load regulation for +5V output is less than ñ 2%, for + 5V(Viso) outputs are less than ñ 4%, for ñ12V outputs are less than ñ 4% for +24V outputs are less than ñ7%. Measuring is done by changing the measured output load ñ40% from 60% rated load, and keep other output at 60% rated load.

(4) General Features

(a) Efficiency

The efficiency is higher than 72% while measuring at nominal line and max. load.

(b) Hold up time

The hold up times is longer than 16mS at min. input and max. load which is measured form the end of the last charging pulse to when the main output drop to 95% output voltage.

(c) Protection

.Overload protection

The power supply will go into hiccup mode against short circuit and over load 15A max. conditions, and will auto-recovery while faulty conditions are removed.

(d) Leakage current

The leakage current is less than 1A while measuring at nominal line and max. load.

(e) AC noise

A pulse width lus, + & - polarity, square wave, 500 volts, input phase 0, 90, 180, 270 infulence for AC input shall not effect the output.

(f) Lightning surge

IEC 801-5/label 2 KV (min).

(5) Environment Specification

(a) Operating temperature

0°C to 40°C

(b) Storage temperature

-20° C to 85°C

(c) Operating humidity

20% RH~90%RH

(6) International Standards

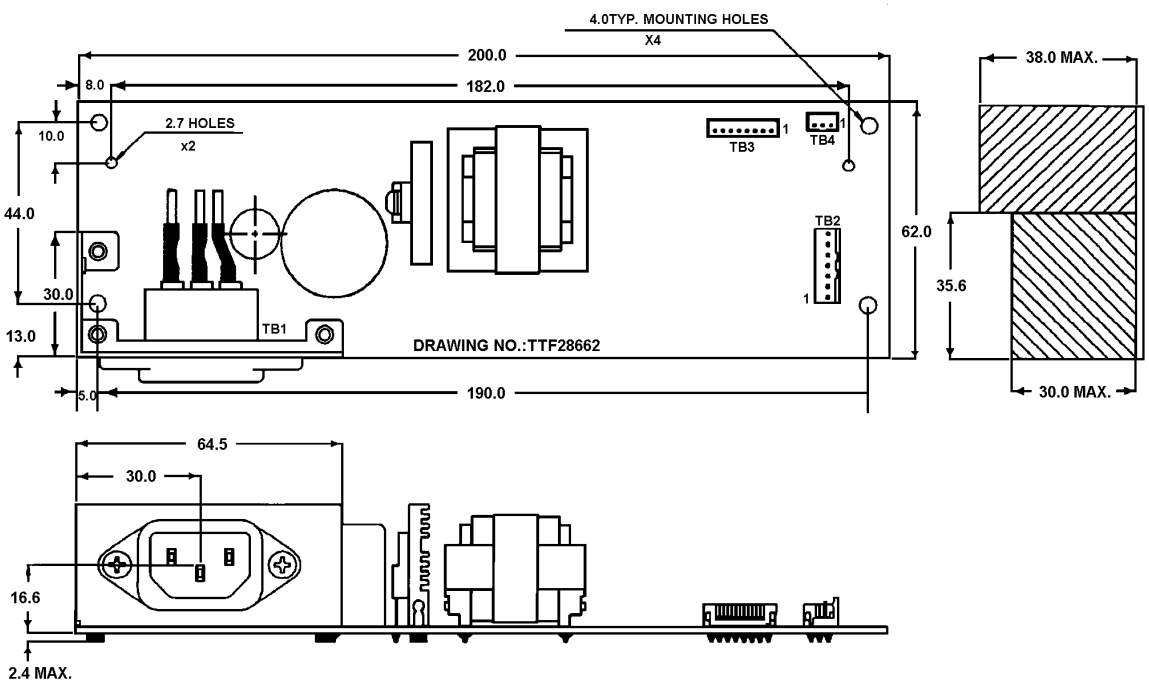
(a) Safety standards

Designed standards
UL 1950 D3
CSA 22.2 NO. 234, 950
VDE EN 60 950
NEM KO
DEM KO
SEM KO
OSE TI

(b) EMI standards

Designed to meet the following conducted limits
VFG 243/leel
CISPR 22 Class “B”

(7) Mechanical Specification



(a) Dimensions:

Dimensions shown in mm (inch) as above. Tolerance specified is + - 0.4mm.

(b) Connectors

TB1--AC input: Meet IEC 320/ CEE 22 standard
TB2--DC output: JAEIL-G-7P-S3T2-E
TB3--DC output: JAEIL-S-8P-S2T2-EF
TB4--+24Viso & +5Viso DC output: JAEIL-S-8P-S2T2-EF

(c) DC output pin assignment

PIN	TB2	TB3	TB4
1	+5V	GND	+24Viso
2	+5V	GND	+5Viso
3	GND	GND	Floating (-)
4	GND	GND	
5	+12V	+24V	
6	GND	+24V	
7	-12V	+24V	
8		+24V	

8.6.2 Power Circuit Diagram

(1) Circuit Description

(a) EMI filter

C1, C2, C3, C4, and L3(NF1) constitute EMI filter circuit. As the operating freqt of this power supply circuit is 60KHx, radio frequency interference wave will incur under the st electricate of the highe frequency in order to prevent it from inte other electric products via its input terminal.

(b) The limiting of inrush current

The action of R1 (PT1) thermal resistor is to limit the transient enormous cu occurred due to rapid charge of C5 on switching on, the feature of the thermal resistor is to become allmost short due to the passing of current to cause the dropping of resistance on switching on, it will not cause too much voltage dropping after the circuit operates normally.
The thermal resistor retains considerable temperature for sometime after switchin the resistance is still bery low by this time. If restart immediately after bring the a of limiting inrush current into fully play, the circuit and switch are easy to incur fault resulting from the flow of enormous current over the primary side; accordingly it requires to wait for 20 seconds at least before restarting after switched off.

(c) AC-DC rectifying and filtering

DB1 is bridge rectifier of the part of input and C5 is filter condenser. The input AC voltage is rectfied and filtered by DB1 and C5 and changed to be DC voltage; the value of the DC voltage after rectifying is approx. 1.4 times of AC input RMS value.

(d) Switch parts and action principle

The switch adopts MOS-FET, the witching feature is excellent in both high speed high frequency. The waveform of Q1 is triggerred by the switch of pin 6 of IC2. While Q1 becomes conductive, initial current will folw through the primary side winding of the transformer gradually and store electric potential in it; on accout of the polarities of the input and output windings of the current limiting coil of the transformer are opposite, all output diodes bear inverse bias, no energy is shifted to load at the time.

While FET is not conductive, the drain of Q1 should bear over two times input voltage, owing to the disappearing of magnetic field resulting in opposite polarities of the windings, the diode on the secondary side will become conductive to charge the capacity of the output side and cause the presenting of voltage on the output side to output current. D1, R4 and DZ1 (D5, C6, R7) from a limiting circuit to lilmit the voltage wave peak to be produced by the leaking conductance of the transformer while Q1 is turned off to store energy after the turning off of Q1, the energy will be shifted to C5 condenser. IC1 is primary and secondary sides insulating light coupling IC.

Use of each pin of IC2 is as follows:

Pin 1: Feedback from +5V of secondary is used at +5V regulator.
Pin2: NC.
Pin 3: Current sense from R8 (R9) of over-current detection.
Pin 4: Over-load delay.
Pin 5: Connected to ground.
Pin 6: Wave width control output to drive Q1.
Pin 7: Connected to Vcc.
Pin 8: Restart delay

(e) The part of the secondary side

D3,D4, D5, D6, D7, D8, C12, C14, C16, C22, C25, and C18, form rectifying circuit, it transforms AC low voltage into DC low voltage L4, L5, L6, L7, L8, C15, C17, C23, C26, and C19 to form high fequencly filtering circuit to cause the reduction of high frequency ripple and noise.

Note: The circuit description of power supply above mentioned is mainly concerned about SNP-2866-2.

8.6.3 Indication of Eliminating Defects for TTF-2866-2

(1) When no output voltage is found, please measure the AC input first to see if any power exists or not.

(2) When the fuse is broken, please test if DB1 and Q1-MOSFET work properly.

After you make sure that the DB1 and Q1 can work properly, then you can consider to replace a new fuse to aboid dangers.

(3) If the Fuse, Q1, and DB1… etc. are tested with the result of working properly but the power supply unit is still no action, it could be no action of touching-off at IC2, please replace a new IC2.

(4) If the +5V has output boltage, but one of the other outputs is found with no output, then there might be defects in the circuitry of that single output. Therefore, the defects can be found out by inspecting the breakdown output circuitry and then can be repaired.

(5) When using the power supply unit improperly, the status such as shorting output, burning sown the secondary output dilde will occur and also the protection mode to the power supply unit will be also caused. In this case, to eliminate the short position and replace a new diode in order to have the power supply unit work properly.

(6) For the request of adjusting +5V output voltage up and down, to add an appropriate value of resistor at R12A then the +5V voltage can be decreased, and to add an appropriate value of resistor at R13A then the +5V voltage can be increased.

CHAPTER 9

FAX CIRCUIT DIAGRAM